

**MATERIEL COMMAND** 

# PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL

- COMMITTED TO PROTECTION OF THE ENVIRONMENT -

DRAFT FINAL
DETAILED ANALYSIS
OF ALTERNATIVES REPORT
VERSION 2.0
STRUCTURES DAA
VOLUME VI of VII

JULY 1993 CONTRACT NO. DAAA 05-92-D-0002

DISTRIBUTION STATEMENT A

Approved for public release:
Distribution Unkinited

## **EBASCO SERVICES INCORPORATED**

James M. Montgomery
International Dismantling & Machinery
Greystone Environmental
Hazen Research
DataChem BC Analytical

REQUESTS FOR COPIES OF THIS DOCUMENT SHOULD BE REFERRED TO THE PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL AMXRM-PM COMMERCE CITY, CO 80022

DTIC QUALITY INSPECTATO 1

## REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

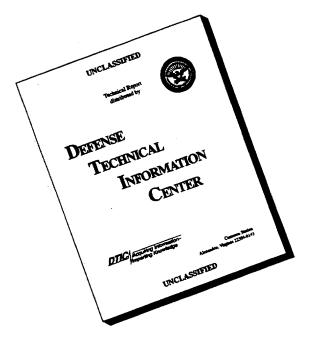
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AN	D DATES COVERED
	07/00/93		
4. TITLE AND SUBTITLE			5. FUNDING NUMBERS
DETAILED ANALYSIS OF ALTERNATIVE	S REPORT, DRAFT FINAL, VERS	SION 2.0	
	•		
			·
6. AUTHOR(S)			
			DAAA05 92 D 0002
	(2)		O DEDECOMING ORGANIZATION
7. PERFORMING ORGANIZATION NAME	(S) AND ADDRESS(ES)		8. PERFORMING ORGANIZATION REPORT NUMBER
·			·
EBASCO SERVICES, INC.			1
DENVER, CO	•		93200R05
			93200R03
9. SPONSORING/MONITORING AGENCY	NAME(S) AND ADDRESS(ES)		10. SPONSORING / MONITORING
J. J. CHOCKING, MICH.			AGENCY REPORT NUMBER
DUCT CHUIDONNENT AND INCOLORS	IDE INC		
RUST ENVIRONMENT AND INFRASTRUCTO ENGLEWOOD, CO	UKE, INC.		
ENGLEWOOD, CO			·
11. SUPPLEMENTARY NOTES			
	•		
	WOFOODDA		
STORED IN BUILDING 618. SEE THE			Liel Distribution cons
12a. DISTRIBUTION / AVAILABILITY STA	TEMENT	•	12b. DISTRIBUTION CODE
APPROVED FOR PUBLIC RELE	ASE; DISTRIBUTION I	S UNLIMITED	
	•		
13. ABSTRACT (Maximum 200 words)			
1 121 Maritimes (management 20 moles)			

THE CONDUCT OF THE FEASIBILITY STUDY (FS) UNDER CERCLA IS ACCOMPLISHED IN TWO STEPS. THE FIRST STEP, THE DEVELOPMENT AND SCREENING OF ALTERNATIVES (DSA), INVOLVES IDENTIFYING AND SCREENING A BROAD SELECTION OF ALTERNATIVES THAT ACHIEVE THE REMEDIAL ACTION OBJECTIVES (ROAS). THE SECOND STEP IS THE DAA. THE OBJECTIVES OF THE DAA INCLUDE THE FOLLOWING: (1) PROVIDE A MORE DETAILED DEFINITION OF EACH ALTERNATIVE RETAINED IN THE DSA, AS NECESSARY, WITH RESPECT TO THE VOLUMES OR AREAS OF CONTAMINATED MEDIA TO BE ADDRESSED, THE TECHNOLOGIES TO BE USED, AND ANY PERFORMANCE REQUIREMENTS ASSOCIATED WITH THOSE TECHNOLOGIES. (2) ASSESS EACH ALTERNATIVE AGAINST THE DAA EVALUATION CRITERIA IDENTIFIED IN THE NATIONAL CONTINGENCY PLAN AND DEFINED IN U.S. EPA GUIDANCE (EPA 1988). (3) PERFORM A COMPARATIVE ANALYSIS AMONG THE ALTERNATIVES TO EVALUATE THE RELATIVE PERFORMANCE OF EACH ALTERNATIVE WITH RESPESCT TO EACH EVALUATION CRITERION. (4) SELECT A PREFERRED ALTERNATIVE FOR EACH MEDIUM GROUP BASED ON THE COMPARATIVE ANALYSIS. THE DAA REPORT CONSISTS OF SEVEN VOLUMES. VOLUME I - EXECUTIVE

14. SUBJECT TERMS			15. NUMBER OF PAGES
SOIL, WATER, STRUCTURES, ARA	ARS, DAA, LAND USE, UXO		16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

MEDINARINA MARINA

# DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

## TECHNICAL SUPPORT FOR ROCKY MOUNTAIN ARSENAL

DRAFT FINAL
DETAILED ANALYSIS
OF ALTERNATIVES REPORT
VERSION 2.0
STRUCTURES DAA
VOLUME VI of VII

JULY 1993 CONTRACT NO. DAAA 05-92-D-0002

Prepared by:

EBASCO SERVICES INCORPORATED RUST Environment and Infrastructure Baker Consultants, Inc.

19960124 089

Prepared for:

U.S. Army Program Manager's Office for the Rocky Mountain Arsenal

THE INFORMATION AND CONCLUSIONS PRESENTED IN THIS REPORT REPRESENT THE OFFICIAL POSITION OF THE DEPARTMENT OF THE ARMY UNLESS EXPRESSLY MODIFIED BY A SUBSEQUENT DOCUMENT. THIS REPORT CONSTITUTES THE RELEVANT PORTION OF THE ADMININSTRATIVE RECORD FOR THIS CERCLA OPERABLE UNIT.

THE USE OF TRADE NAMES IN THIS REPORT DOES NOT CONSTITUTE AN OFFICIAL ENDORSEMENT OR APPROVAL OF THE USE OF SUCH COMMERCIAL PRODUCTS. THIS REPORT MAY NOT BE CITED FOR PURPOSES OF ADVERTISEMENT.

## DIRECTORY, TABLE OF CONTENTS

VOLUME I of VII	EXECUTIVE SUMMARY	i
VOLUME II of VII	SOILS DAA (Sections 1 through 12)	ii
VOLUME III of VII	SOILS DAA (Sections 13 through 21)	vii
VOLUME IV of VII	SOILS DAA (Appendices)	xi
VOLUME V of VII	WATER DAA	xii
VOLUME VI of VII	STRUCTURES DAA	xv
VOLUME VII of VII	TECHNOLOGY DESCRIPTIONS and ARARs	x)
LIST C	OF TABLES	xxiv
LIST C	OF FIGURES	xxx
LIST (	OF PLATES	xxxi
I IST (	OF ACRONYMS AND ABBREVIATIONS	x

## TABLE OF CONTENTS

VOLUN	ME I of	VII – EXE	ECUTIVE SUMMARY
1.0	PUR	POSE	
2.0	INTF	RODUCTION	ON
	2.1	BACKO	GROUND
	2.2	PREVIO	OUS RESPONSE ACTIONS
	2.3	REMEI	DIAL INVESTIGATION
	2.4	INTEG	RATED ENDANGERMENT ASSESSMENT/RISK CHARACTERIZATION
		2.4.1	Human Health Risk Characterization
			2.4.1.1 Site-Specific Evaluation
			2.4.1.2 Boring-by-Boring Analysis
			2.4.1.3 Evaluation of Acute/Subchronic Risks
		2.4.2	Ecological Risk Characterization Approach
			2.4.2.1 Ecological Risk Characterization Approach
			2.4.2.2 Limitations of the Ecological Risk Characterization
		2.4.3	Limitations Common to All Quantitative Risk Evaluations
		2.4.4	Qualitative Assessment
		2.4.5	Current FS/IEA Coordination
	2.5		BILITY STUDY
3.0	DET	AILED A	NALYSIS OF ALTERNATIVES METHODOLOGY
	3.1		OACH
	3.2		JATION CRITERIA
		3.2.1	Threshold Criteria
			3.2.1.1 Overall Protection of Human Health
			and the Environment
			3.2.1.2 Compliance with ARARs
		3.2.2	Primary Balancing Criteria
			3.2.2.1 Long-Term Effectiveness and Permanence
			3.2.2.2 Reduction of Toxicity, Mobility, or Volume (TMV)
			3.2.2.3 Short-Term Effectiveness
			3.2.2.4 Implimentability
			3.2.2.5 Cost
		3.2.3	Modifying Criteria
		+·-·+	3.2.3.1 State Acceptance
			3.2.3.2 Community Acceptance
	3.3	SITE S	PECIFIC CONSIDERATIONS
		3.3.1	Policy and Regulatory Factors
			3.3.1.1 Army Policy
			3.3.1.2 Federal Facility Agreement
		3.3.2	Future Land Use Factors
		0.0.0	3.3.2.1 Long-Term Future Land Use
			3.3.2.2 Wildlife Management
			3.3.2.3 U.S. Fish and Wildlife Service Policy
		3.3.3	Other Factors Affecting Selection of Remedial Alternatives
		5.5.5	3.3.3.1 Worker Health and Safety
			3.3.3.2 Status of Technology Development
			3.3.3.3 Natural Attenuation of Contaminants
			3.3.3.4 Community Involvement
			3.3.3.5 Previous and Ongoing Remedial Actions
			3.3.3.6 Risk Management
			ال المارين الم

4.0	SUM	MARY OF	F THE DETAILED ANALYSIS OF ALTERNATIVES FOR SOILS	35
	4.1		IIZATION	35
	4.2	SOILS I	DAA APPROACH	35
	4.3	ANALY	SIS OF ALTERNATIVES	36
	4.4		TION OF PREFERRED ALTERNATIVES	36
		4.4.1	Munitions Testing Medium Group	37
		4.4.2	Agent Storage Medium Group	37
		4.4.3	Lake Sediments Medium Group	38
		4.4.4	Surficial Soils Medium Group	38
		4.4.5	Ditches/Drainage Areas Medium Group	38
		4.4.6	Basin A Medium Group	39
		4.4.7	Basin F Wastepile Medium Group	40
		4.4.8	Secondary Basins Medium Group	41
		4.4.9	Sewer Systems Medium Group	42
		4.4.10	Disposal Trenches Medium Group	42
		4.4.11	Sanitary Landfills Medium Group	44
		4.4.12	Lime Basins Medium Group	45
		4.4.13	South Plants Medium Group	45
		4.4.14	Buried Sediments/Ditches Medium Group	47
		4.4.15	Undifferentiated Medium Group	48
		4.4.15	Overview of Preferred Alternatives	49
		4.4.10	Overview of Freiented Antennatives	-1,7
5.0	CITM	MARY O	F THE DETAILED ANALYSIS OF ALTERNATIVES FOR WATER	56
5.0	5.1		VIZATION	56
	5.2		R DAA APPROACH	56
	3.2	5.2.1	Plume Evaluation Criteria	56
		5.2.1	Target Effluent Criteria	57
		5.2.3	Design Treatment Goals	57
		5.2.4	Groundwater Data Update	57
		5.2.5	Subregional Groundwater Modeling	57
		5.2.6	Phasing of Groundwater Remedial Activities	58
		5.2.7	Combined Treatment Alternatives	58
	5.3		JATION OF ALTERNATIVES	59
	5.3 5.4		TION OF PREFERRED ALTERNATIVES	59
	3.4	5.4.1	Western Plume Group	60
			Northwest Boundary Plume Group	60
		5.4.2		60
		5.4.3	North Boundary Plume Group	60
		5.4.4	Basin A Plume Group	60
		5.4.5	South Plants Plume Group	OC.
6.0	CI IN	MARYA	F THE DETAILED ANALYSIS OF ALTERNATIVES FOR STRUCTURES	65
0.0	6.1		VIZATION	65
	6.2		TURES DAA APPROACH	65
	6.3		JATION OF ALTERNATIVES	66
	6.4		TION OF PREFERRED ALTERNATIVES	66
	0.4	SELEC	HOR OF TREE ENGLY ALTERNATIVES	00
7.0	SITM	MARY		69
7.0	301	LATE MAN		
8 A	DEE	EDENCES		72

<b>VOLU</b>	ME II of	VII – SOI	LS DAA (Sections 1 - 12)						
1.0	INTR		ON	1-1					
	1.1		SE	1-2					
	1.2	BACKG	ROUND	1-3					
	1.3		VIAL ACTION OBJECTIVES	1-6					
	1.4	SOILS I	EVALUATION CRITERIA	1-8					
		1.4.1	Preliminary Remediation Goals	1-10					
		1.4.2	Site Evaluation Criteria	1-11					
		1.4.3	Principal Threat Criteria	1-14					
	1.5		CTERIZATION AND GROUPING OF SOILS SITES	1-17					
	1.6	DETAIL	LING OF SOILS ALTERNATIVES	1-18					
2.0	MED	MEDIA INTERACTIONS							
	2.1	WATER	VSOILS INTERACTION	2-1					
		2.1.1	Surface Water Interactions	2-1					
		2.1.2	Groundwater Interactions	2-2					
	2.2	STRUC'	TURES/SOILS INTERACTION	2-3					
	2.3	BIOTA/	SOILS INTERACTIONS	2-3					
	2.4	AIR/SO	ILS INTERACTIONS	2-4					
3.0	MET	HODOLO	GY	3-1					
5.0	3.1		LING OF ALTERNATIVES	3-1					
	5.1	3.1.1	Evaluation of Medium Groups	3-2					
		3.1.2	Centralized Treatment Facilities	3-5					
		3.1.3	Centralized Containment Facilities	3-6					
	3.2		VATION OF INDIVIDUAL ALTERNATIVES	3-7					
	3.3		TION OF PREFERRED ALTERNATIVES	3-8					
4.0	DET	AILING O	OF ALTERNATIVES	4-1					
4.0	4.1	BASIS	OF ALTERNATIVE DETAILING	4-1					
	4.2		VIEW OF ALTERNATIVE MODIFICATIONS	4-2					
		4.2.1	Principal Threat Alternatives	4-2					
		4.2.2	Incorporation of Consolidation Alternatives	4-4					
		4.2.3	Treatment Alternatives	4-5					
	4.3	ALTER	NATIVES FOR THE POTENTIAL UXO PRESENCE CATEGORY	4-6					
		4.3.1	Alternative U1: No Additional Action						
			(Provisions of FFA)	4-7					
		4.3.2	Alternative U2: Caps/Covers (Soil Cover)	4-7					
		4.3.3	Alternative U3: Detonation (On-Post Detonation);						
			Incineration/Pyrolysis (Rotary Kiln Incineration)						
			(Rotary Kiln)	4-8					
		4.3.4	Alternative U3a: Detonation (On-Post Detonation)	4-10					
		4.3.5	Alternative U4: Detonation (Off-Post Facility);						
			Incineration/Pyrolysis (Off-Post Incineration)	4-11					
		4.3.6	Alternative U4a: Detonation (Off-Post Army Facility)	4-12					
	4.4	ALTER	NATIVES FOR THE POTENTIAL AGENT PRESENCE						
			ORY	4-13					
		4.4.1	Alternative A1: No Additional Action (Provisions of FFA)	4-13					
		4.4.2	Alternative A2: Caps/Covers (Soil Cover)	4-14					
		4.4.3	Alternative A3: Soil Washing (Solution Washing);						
			Landfill (On-Post Landfill)	4-14					
		4.4.4	Alternative A4: Incineration/Pyrolysis (Rotary Kiln Incineration)	4-16					

	4.4.5	Alternative A5: Soil Washing (Solvent Washing);	
		Landfill (On-Post Landfill)	4-17
4.5	ALTERN	VATIVES FOR THE BIOTA EXCEEDANCE CATEGORY	4-19
	4.5.1	Alternative B1: No Additional Action (Provisions of FFA)	4-20
	4.5.2	Alternative B1a: Caps/Covers (Clay/Soil Cap) with Consolidation;	
		No Addition Action (Provisions of FFA)	4-20
	4.5.3	Alternative B2: Biota Management (Exclusion Habitat Modification)	4-21
	4.5.4	Alternative B3: Landfill (On-Post Landfill)	4-22
	4.5.5	Alternative B5a: Caps/Covers (Clay/Soil Cap) with Consolidation	4-23
	4.5.6	Alternative B6: Direct Thermal Desorption (Direct Heating)	4-24
	4.5.7	Alternative B9: In Situ Biological Treatment	
		(Landfarm/Agricultural Practice)	4-25
	4.5.8	Alternative B10: Caps/Covers (Clay/Soil Cap) with Consolidation;	
		In Situ Biological Treatment (Aerobic Biodegradation)	4-27
	4.5.9	Alternative B11: In Situ Thermal Treatment (Surface Soil Heating)	4-29
	4.5.10	Biota Alternatives for Human Health Exceedance	
		Category Medium Groups	4-30
4.6	ALTERN	NATIVES FOR THE HUMAN HEALTH EXCEEDANCE CATEGORY	4-31
	4.6.1	Alternative 1: No Additional Action (Provisions of FFA)	4-31
	4.6.2	Alternative 1a: Direct Thermal Desorption (Direct Heating)	
		of Principal Threat Volume; No Additional	
		Action (Provisions of FFA)	4-32
	4.6.3	Alternative 1b: Direct Thermal Desorption (Direct Heating)	
		and Direct Solidification/Stabilization (Cement-Based Solidification)	
		of Principal Threat Volume; No Additional Action (Provisions of FFA)	4-33
	4.6.4	Alternative 2: Access Restrictions (Modifications to the FFA)	4-35
	4.6.5	Alternative 2a: Direct Thermal Desorption (Direct Heating) of	
		Principal Threat Volume; Access Restrictions	
		(Modifications to the FFA)	4-36
	4.6.6	Alternative 3: Landfill (On-Post Landfill)	4-38
	4.6.7	Alternative 3a: Direct Thermal Desorption (Direct Heating) of	
		Principal Threat Volume; Landfill (On-Post Landfill)	4-40
	4.6.8	Alternative 5: Caps/Covers (Clay/Soil Cap);	
		Vertical Barriers (Slurry Wall)	4-42
	4.6.9	Alternative 5a: Caps/Covers (Clay/Soil Cap);	
		Vertical Barriers (Slurry Walls) with Modifications to Existing System	4-44
	4.6.10	Alternative 5b: Caps/Covers (Clay/Soil Cap);	
		Vertical Barriers (Slurry Walls) with Consolidation	4-45
	4.6.11	Alternative 6: Caps/Covers (Clay/Soil Cap)	4-46
	4.6.12	Alternative 6a: Direct Thermal Desorption (Direct Heating) and	
		Direct Solidification/Stabilization (Cement-Based Solidification)	
		of Principal Threat Volume; Caps/Covers (Clay/Soil Cap)	4-46
	4.6.13	Alternative 6b: Direct Thermal Desorption (Direct Heating) of	
		Principal Threat Volume; Caps/Covers (Clay/Soil Cap) with Consolidation	4-48
	4.6.14	Alternative 6c: Direct Thermal Desorption (Direct Heating) of	_
		Principal Threat Volume; Caps/Covers (Clay/Soil Cap) with	
		Modifications to Existing System	4-49
	4.6.15	Alternative 6d: Caps/Covers (Clay/Soil Cap) with Modifications	
	-	to Existing System	4-50
	4.6.16	Alternative 6e: Caps/Covers (Composite Cap)	4-50
	4.6.17	Alternative 6f: Direct Thermal Desorption (Direct Heating) of	
		Principal Threat Volume; Caps/Covers (Clay/Soil Cap)	4-51
	4.6.18	Alternative 6g: Caps/Covers (Clay/Soil Cap) with Consolidation	4-52

		4.6.19	Alternative 8: Direct Soil Washing (Solvent Washing);	
			Direct Solidification Stabilization (Cement-Based	
			Solidification)	4-53
		4.6.20	Alternative 8a: Direct Soil Washing (Solvent Washing)	4-54
		4.6.21	Alternative 9a: Direct Soil Washing (Solution Washing);	
			Direct Thermal Desorption (Direct Heating);	
			Direct Solidification Stabilization (Cement-Based Solidification)	4-56
		4.6.22	Alternative 10: Direct Solidification/Stabilization	
			(Cement-Based Solidification)	4-57
		4.6.23	Alternative 13: Direct Thermal Desorption (Direct Heating);	
			Direct Solidification/Stabilization (Cement-Based Solidification)	4-59
		4.6.24	Alternative 13a: Direct Thermal Desorption (Direct Heating)	4-61
		4.6.25	Alternative 13b: Direct Thermal Desorption (Direct Heating);	
			Landfill (On-Post Landfill)	4-62
	•	4.6.26	Alternative 14: Incineration/Pyrolysis (Rotary Kiln):	
			Landfill (On-Post Landfill)	4-63
		4.6.27	Alternative 16a: In Situ Physical/Chemical Treatment	
			(Vacuum Extraction)	4-65
		4.6.28	Alternative 17: In Situ Physical/Chemical Treatment (Soil Flushing);	
			In Situ Thermal Treatment (Surface Soil Heating)	4-66
		4.6.29	Alternative 19: In Situ Thermal Treatment (RF/Microwave Heating);	4.60
			In Situ Solidification/Stabilization (Cement-Based Solidification)	4-68
		4.6.30	Alternative 19a: In Situ Thermal Treatment (RF/Microwave Heating)	4-70
		4.6.31	Alternative 19b: In Situ Thermal Treatment (RF/Microwave Heating,	4-71
		4 6 00	Surface Soil Heating)	4-/1
		4.6.32	Alternative 20: In Situ Thermal Treatment (Surface Soil Heating);	
			Direct Thermal Desorption (Direct Heating); Direct	4-71
		4.6.33	Solidification/Stabilization (Cement-Based Solidification) Alternative 21: In Situ Thermal Treatment (In Situ Vitrification)	4-73
		4.0.33	Alternative 21. In Situ Thermal Treatment (in Situ vitimeation)	7-15
5.0	DET.	AII ED AN	JALYSIS OF ALTERNATIVES FOR THE MUNITIONS TESTING	
5.0			OUP	5-1
	5.1	MEDIU	M GROUP CHARACTERISTICS	5-2
	5.2		ATION OF ALTERNATIVES	5-3
	٥.2	5.2.1	Alternative U1: No Additional Action	5-3
		5.2.2	Alternative U2: Caps/Covers	5-4
		5.2.3	Alternative U3: Incineration/Pyrolysis	5-4
		5.2.4	Alternative U4a: Detonation	5-5
	5.3	SELECT	TION OF PREFERRED ALTERNATIVE	5-6
6.0	DET	AILED AN	NALYSIS OF ALTERNATIVES FOR THE AGENT STORAGE	
	MED		OUP	6-1
	6.1		PLANTS SUBGROUP CHARACTERISTICS	6-2
	6.2	NORTH	PLANTS SUBGROUP EVALUATION OF ALTERNATIVES	6-4
		6.2.1	Alternative A1: No Additional Action	6-4
		6.2.2	Alternative A2: Caps/Covers	6-5
		6.2.3	Alternative A3: Soil Washing; Landfill	6-5
		6.2.4	Alternative A4: Incineration/Pyrolysis	6-7
		6.2.5	Alternative A5: Soil Solvent Washing; Landfill	6-8
	6.3		PLANTS SUBGROUP SELECTION OF PREFERRED	_
			NATIVE	6-10
	6.4		STORAGE YARDS SUBGROUP CHARACTERISTICS	6-12
	6.5	TOXIC	STORAGE YARDS SUBGROUP EVALUATION OF	

		ALTER	NATIVES	6-13					
		6.5.1	Alternative A1: No Additional Action	6-13					
		6.5.2	Alternative A2: Caps/Covers	6-14					
		6.5.3	Alternative A3: Soil Washing; Landfill	6-14					
		6.5.4	Alternative A4: Incineration/Pyrolysis	6-16					
		6.5.5	Alternative A5: Soil Solvent Washing; Landfill	6-17					
	6.6	TOXIC	STORAGE YARDS SUBGROUP SELECTION OF						
		PREFEI	RRED ALTERNATIVE	6-19					
7.0	DET	DETAILED ANALYSIS OF ALTERNATIVES FOR THE LAKE SEDIMENTS							
	MED	IUM GRO	DUP	7-1					
	7.1	MEDIU	M GROUP CHARACTERISTICS	7-2					
	7.2	EVALU	JATION OF ALTERNATIVES	7-3					
		7.2.1	Alternative B1: No Additional Action	7-4					
		7.2.2	Alternative B1a: Caps/Covers with						
			Consolidation; No Additional Action	7-4					
		7.2.3	Alternative B3: Landfill	7-6					
		7.2.4	Alternative B6: Direct Thermal Desorption	7-7					
		7.2.5	Alternative B10: Caps/Covers with						
			Consolidation; In Situ Biological Treatment	7-8					
	7.3	SELEC	TION OF PREFERRED ALTERNATIVE	7-10					
8.0	DET.	DETAILED ANALYSIS OF ALTERNATIVES FOR THE SURFICIAL SOILS							
	MED	EDIUM GROUP							
	8.1	MEDIU	M GROUP CHARACTERISTICS	8-2					
	8.2	EVALU	JATION OF ALTERNATIVES	8-3					
		8.2.1	Alternative B1: No Additional Action	8-3					
		8.2.2	Alternative B3: Landfill	8-4					
		8.2.3	Alternative B9: In Situ Biological						
			Treatment	8-4					
		8.2.4	Alternative B11: In Situ Thermal						
			Treatment	8-5					
	8.3	SELEC	TION OF PREFERRED ALTERNATIVE	8-6					
9.0	DET.	AILED A	NALYSIS OF ALTERNATIVES FOR THE DITCHES/DRAINAGE AREAS						
	MED	IUM GRO	OUP	9-1					
	9.1		M GROUP CHARACTERISTICS	9-2					
	9.2	EVALU	JATION OF ALTERNATIVES	9-3					
		9.2.1	Alternative B1: No Additional Action	9-3					
		9.2.2	Alternative B2: Biota Management	9-4					
		9.2.3	Alternative B3: Landfill	9-4					
		9.2.4	Alternative B5a: Caps/Covers with						
			Consolidation	9-5					
		9.2.5	Alternative B6: Direct Thermal Desorption	9-6					
		9.2.6	Alternative B9: In Situ Biological						
			Treatment	9-7					
	9.3	SELEC	TION OF PREFERRED ALTERNATIVE	9-8					
10.0	DET	AILED AI	NALYSIS OF ALTERNATIVES FOR THE BASIN A						
	MED		OUP	10-1					
	10.1	MEDIU	JM GROUP CHARACTERISTICS	10-2					
	10.2	BASIN	A MEDIUM GROUP EVALUATION OF ALTERNATIVES	10-4					

		10.2.1	Alternative 1/B1/A1/U1: No Additional	
			Action	10-4
		10.2.2	Alternative 1a/B1/A1/U1: Direct Thermal	
			Desorption of Principal Threat Volume;	
			No Additional Action	10-5
		10.2.3	Alternative 3/B3/A4/U4: Landfill	10-7
		10.2.4	Alternative 6/B5/A2/U2: Caps/Covers	10-9
		10.2.5	Alternative 6f/B5/A2/U2: Direct Thermal Desorption of Principal	
			Threat Volume; Caps/Covers	10-10
		10.2.6	Alternative 8/B12/A5/U4: Direct Soil Washing; Direct Thermal	
			Desorption; Direct Solidification/Stabilization	10-12
		10.2.7	Alternative 13/B6/A4/U4: Direct Thermal Desorption; Direct	
			Solidification/Stabilization	10-14
		10.2.8	Alternative 17/B11/A4/U4: In Situ Physical/Chemical	
			Treatment; In Situ Thermal Treatment	10-16
		10.2.9	Alternative 19/B11a/A4/U4: In Situ Thermal Treatment;	
			In Situ Solidification/Stabilization	10-16
	10.3	SELECT	TON OF PREFERRED ALTERNATIVE	10-20
11.0	DETA	ILED AN	IALYSIS OF ALTERNATIVES FOR THE BASIN F WASTEPILE	
11.0			UP	11-1
	11.1		M GROUP CHARACTERISTICS	11-2
	11.2		ATION OF ALTERNATIVES	11-4
	11.2	11.2.1	Alternative 1: No Additional Action	11-5
		11.2.2	Alternative 2: Access Restrictions	11-6
		11.2.3	Alternative 6e: Caps/Covers	11-7
		11.2.4	Alternative 8a: Direct Soil Washing	11-8
		11.2.5	Alternative 9a: Direct Soil Washing; Direct Thermal Desorption	11-9
		11.2.6	Alternative 13a: Direct Thermal Desorption	11-11
	11.3		TION OF PREFERRED ALTERNATIVE	11-12
10.0	DETA	HED AN	IALYSIS OF ALTERNATIVES FOR THE SECONDARY BASINS	
12.0			OUP	12-1
			DARY BASINS SUBGROUP CHARACTERISTICS	12-1
	12.1		DARY BASINS SUBGROUP CHARACTERISTICS	12-2
	12.2		NATIVES	12-3
			Alternative 1/B1: No Additional Action	12-3
		12.2.1	Alternative 2/B2: Access Restrictions	12-4
		12.2.2	Alternative 6/B5: Caps/Covers	12-5
		12.2.3	Alternative 6g/B5a: Caps/Covers with Consolidation	12-6
		12.2.4	Alternative 0g/B/3a. Caps/covers with Consondation	12-7
		12.2.5	Alternative 19a/B11a: In Situ Thermal Treatment	12-8
	12.3		DARY BASINS SUBGROUP SELECTION OF PREFERRED	12.0
	14.5		NATIVE	12-9
	12.4		R BASIN F SUBGROUP CHARACTERISTICS	12-11
	12.4		R BASIN F SUBGROUP EVALUATION OF ALTERNATIVES	12-13
	14.5	12.5.1	Alternative 1/B1: No Additional Action	12-14
		12.5.1	Alternative 1a/B1: No Additional Action	12-17
		12.3.2	Principal Threat Volume; No Additional Action	12-14
		12.5.3	Alternative 2a/B2: Direct Thermal Desorption of	12-17
		14.3.3	Principal Threat Volume; Access Restrictions	12-16
		12.5.4	Alternative 6c/B5b: Direct Thermal Desorption of	12-10
		14.5.7	Principal Threat Volume; Caps/Covers with	
			A THISTON A THOUGHT ORDING CONTROL WILL	

			Modification to Existing System	12-17
		12.5.5	Alternative 6d/B5b: Caps/Covers with Modifications to	
			Existing System	12-19
		12.5.6	Alternative 13a/B6: Direct Thermal Desorption	12-20
		12.5.7	Alternative 19a/B11a: In Situ Thermal Treatment	12-21
	12.6		R BASIN F SUBGROUP SELECTION OF PREFERRED	10.00
		ALTERN	IATIVE	12-22
	12.7	BASIN F	EXTERIOR SUBGROUP CHARACTERISTICS	12-25
	12.8		EXTERIOR SUBGROUP EVALUATION OF	
		ALTERN	IATIVES	12-26
		12.8.1	Alternative 1/B1: No Additional Action	12-27
		12.8.2	Alternative 2/B2: Access Restrictions	12-27
		12.8.3	Alternative 6/B9: Caps/Covers	12-28
		12.8.4	Alternative 6b/B9: Caps/Covers with Consolidation	12-29
		12.8.5	Alternative 13a/B9: Direct Thermal Desorption	12-31
		12.8.6	Alternative 19b/B9: In Situ Thermal Treatment	12-32
	12.9	BASIN F	EXTERIOR SUBGROUP SELECTION OF PREFERRED	
		ALTERN	VATIVE	12-33
<b>VOLUME</b>			LS DAA (Sections 13-21)	
13.0	DETA	ILED AN	ALYSIS OF ALTERNATIVES FOR THE SEWER SYSTEMS	
	MEDI		UP	13-1
	13.1		RY/PROCESS WATER SEWERS SUBGROUP	
			CTERISTICS	13-2
	13.2		RY/PROCESS WATER SEWERS SUBGROUP	
		<b>EVALU</b> A	ATION OF ALTERNATIVES	13-4
		13.2.1	Alternative 1/B1: No Additional Action	13-4
		13.2.2	Alternative 2/B1: Access Restrictions	13-5
		13.2.3	Alternative 3/B3: Landfill	13-6
		13.2.4	Alternative 13a/B6: Direct Thermal	
			Desorption	13-7
	13.3	SANITA	RY/PROCESS WATER SEWERS SUBGROUP SELECTION OF	
			RED ALTERNATIVE	13-9
	13.4	CHEMIC	CAL SEWERS SUBGROUP CHARACTERISTICS	13-10
	13.5	CHEMIC	CAL SEWERS SUBGROUP EVALUATION OF	
		ALTERN	NATIVES	13-12
		13.5.1	Alternative 1/A1: No Additional Action	13-12
		13.5.2	Alternative 1a/A1: Direct Thermal Desorption	
			of Principal Threat Volumes; No Additional Action	13-13
		13.5.3	Alternative 2/A1: Access Restrictions	13-15
		13.5.4	Alternative 2a/A1: Direct Thermal Desorption	
			of Principal Threat Volumes; Access Restrictions	13-16
		13.5.5	Alternative 13a/A4: Direct Thermal Desorption of Principal	
		20.0.0	Threat Volumes; Landfill	13-18
		13.5.6	Alternative 8a/A5: Direct Soil Washing	13-20
		13.5.7	Alternative 13a/A4: Direct Thermal Desorption	13-22
	13.6		CAL SEWERS SUBGROUP SELECTION OF PREFERRED	
	15.0		NATIVE	13-23
14.0	DETA	ILED AN	ALYSIS OF ALTERNATIVES FOR THE DISPOSAL TRENCHES	
<b>.</b>			UP	14-1
	14.1		EX TRENCHES SUBGROUP CHARACTERISTICS	14-2
	14.2		EX TRENCHES SUBGROUP EVALUATION	

		OF ALTI	ERNATIVES	14-4
		14.2.1	Alternative 1/B1/A1/U1: No Additional Action	14-4
		14.2.2	Alternative 5b/B5a/A2 and A4/U2 and U4: Caps/Covers; Vertical	
			Barriers with Consolidation	14-5
		14.2.3	Alternative 14/B6/A4/U4: Incineration/Pyrolysis; Landfill	14-7
	14.3		EX TRENCHES SUBGROUP SELECTION OF PREFERRED	
			NATIVE	14-10
	14.4	SHELL	TRENCHES SUBGROUP CHARACTERISTICS	14-13
	14.5	SHELL	TRENCHES SUBGROUP EVALUATION OF ALTERNATIVES	14-14
	14.5	14.5.1	Alternative 1: No Additional Action	14-14
		14.5.2	Alternative 5a: Caps/Covers; Vertical Barriers with	., .,
		17.5.2	Modifications to Existing System	14-15
		14.5.3	Alternative 14: Incineration/Pyrolysis; Landfill	14-16
	14.6		TRENCHES SUBGROUP SELECTION OF PREFERRED	14-10
	14.0		VATIVE	14-18
	147		SUBGROUP CHARACTERISTICS	14-18
	14.7			14-21
	14.8		SUBGROUP EVALUATION OF ALTERNATIVES	14-22
		14.8.1	Alternative 1: No Additional Action	
		14.8.2	Alternative 5: Caps/Covers; Vertical Barriers	14-22
		14.8.3	Alternative 14: Incineration/Pyrolysis; Landfill	14-24
	14.9	HEX PI	SUBGROUP SELECTION OF PREFERRED ALTERNATIVE	14-25
	D		AT TOTAL OF A TEMPORAL PROPERTY OF A DIFFE CADITY A DAY	
15.0			ALYSIS OF ALTERNATIVES FOR THE SANITARY	15-1
			EDIUM GROUP	15-1
	15.1		M GROUP CHARACTERISTICS	15-2
	15.2		ATION OF ALTERNATIVES	
		15.2.1	Alternative 1/B1: No Additional Action	15-4
		15.2.2	Alternative 2/B2: Access Restrictions	15-4
		15.2.3	Alternative 3/B3: Landfill	15-5
		15.2.4	Alternative 5/B5a: Caps/Covers; Vertical Barriers	15-6
		15.2.5	Alternative 13b/B6: Direct Thermal Desorption; Landfill	15-8
	15.3	SELECT	TON OF PREFERRED ALTERNATIVE	15-9
	חדיי	ATT ETS AND	AT VOIC OF ALTERNATIVES FOR THE LIME DASING	
16.0			ALYSIS OF ALTERNATIVES FOR THE LIME BASINS	16-1
			UP	16-1
	16.1			10-2
	16.2		N 36 LIME BASINS SUBGROUP EVALUATION OF	16.2
			NATIVES	16-3
		16.2.1	Alternative 1/B1/A1: No Additional Action	16-4
		16.2.2	Alternative 6d/B5: Caps/Covers with Modifications	
			to Existing System	16-5
		16.2.3	Alternative 13a/B6/A4: Direct Thermal Desorption	16-6
		16.2.4	Alternative 19a/B11a/A4: In Situ Thermal Treatment	16-7
	16.3		N 36 LIME BASINS SUBGROUP SELECTION OF PREFERRED	
		ALTERN	NATIVE	16-9
	16.4		M-1 PITS SUBGROUP CHARACTERISTICS	16-12
	16.5		ATION OF ALTERNATIVES	16-13
		16.5.1	Alternative 1/A1: No Additional Action	16-13
		16.5.2	Alternative 5/A2: Caps/Covers; Vertical Barriers	16-14
		16.5.3	Alternative 10/A4: Direct Solidification/Stabilization	16-15
		16.5.4	Alternative 19/A4: In Situ Thermal Treatment, In Situ	
			Solidification/Stabilization	16-17
		16.5.5	Alternative 21/A1: In Situ Thermal Treatment	16-18

	16.6	BURIED M-1 PITS SUBGROUP SELECTION OF PREFERRED  ALTERNATIVE 1	16-19						
7.0		DETAILED ANALYSIS OF ALTERNATIVES FOR THE SOUTH PLANTS							
	MEDI	DIUM GROUP							
	17.1	SOUTH PLANTS CENTRAL PROCESSING AREA SUBGROUP CHARACTERISTICS	17-						
	17.2	SOUTH PLANTS CENTRAL PROCESSING AREA SUBGROUP EVALUATION OF	17-						
		ALTERNATIVES	17-						
		17.2.1 Alternative 1/Ba/A1: No Additional Action	1/-						
		Solidification/Stabilization of Principal Threat Volume;	17-						
		No Additional Action	17-						
		17.2.3 Alternative 3/B3/A4: Landfill	17-						
		17.2.4 Alternative 6/B5/A2: Caps/Covers	1/-						
		Caps/Covers	17-1						
		17.2.6 Alternative 13/B6/A4: Direct Thermal Desorption; Direct	17-1						
		17.2.7 Alternative 19/B11a/A4: In Situ Thermal Treatment; In Situ	17-1						
			17-1						
	17.3	SOUTH PLANTS CENTRAL PROCESSING AREA SUBGROUP SELECTION	. , .						
	17.3		17-1						
	17.4	OI I RESIDENCE TO THE STATE OF	17-2						
	17.4	SOUTH PLANTS DITCHES SUBGROUP EVALUATION OF							
		I I I I I I I I I I I I I I I I I I I	17-2						
		17.5.1 Alternative 1/B1: No Additional Action	17-2						
		17.5.2 Alternative 1a/B1: Direct Thermal Desorption of							
			17-2						
		111010 Intelligible Dissertation of the contract of the contra	17-2						
		17.5.4 Alternative 6/B5: Caps/Covers	17-2						
		17.5.5 Alternative 6b/B5a: Direct Thermal Desorption of							
			17-2						
		17.5.6 Alternative 13a/B6: Direct Thermal Desorption	17-2						
	17.6	SOUTH PLANTS DITCHES SUBGROUP SELECTION OF PREFERRED							
			17-2						
	17.7	SOUTH PLANTS TANK FARM AREA SUBGROUP							
		CHARACTERISTICS	17-3						
	17.8	SOUTH PLANTS TANK FARM SUBGROUP EVALUATION							
		OF ALTERNATIVES	17-3						
		17.8.1 Alternative 1/B1: No Additional Action	17-3						
		17.8.2 Alternative 3/B3: Landfill	17-3						
		17.8.3 Alternative 6/B5: Caps/Covers	17-3						
			17-3						
			17-3						
			17-3						
	17.9	SOUTH PLANTS TANK FARM SUBGROUP SELECTION OF PREFERRED	17-3						
	17.10	SOUTH PLANTS BALANCE OF AREAS SUBGROUP							
			17-4						
	17.11	SOUTH PLANTS BALANCE OF AREAS SUBGROUP							
		TALLEL TION OF ALTERNIATIVES	17 4						

		17.11.1	Alternative 1/B1/A1/U1: No Additional Action	17-43
		17.11.2	Alternative 1a/B1/A1/U1: Direct Thermal Desorption of	
			Principal Threat Volume; No Additional Action	17-44
		17.11.3	Alternative 3/B3/A4/U4: Landfill	17-46
		17.11.4	Alternative 6/B5/A2/U2: Caps/Covers	17-47
		17.11.5	Alternative 6b/B5a/A4/U4a: Direct Thermal Desorption of	
		17.11.0	Principal Threat Volume; Caps/Covers with Consolidation	17-48
		17.11.6	Alternative 13/B6/A4/U4a: Direct Thermal Desorption;	
		17.11.0	Direct Solidification/Stabilization	17-51
		17.11.7	Alternative 19/B11a/A4/U4a: In Situ Thermal Treatment;	.,
		17.11.7	In Situ Solidification/Stabilization	17-53
		17 11 0	Alternative 20/B6 and B11/A4/U4a: In Situ Thermal Treatment;	17-55
		17.11.8		
			Direct Thermal Desorption; Direct	17 55
			Solidification/Stabilization	17-55
	17.12		PLANTS BALANCE OF AREAS SUBGROUP SELECTION OF	157.50
		PREFER	RED ALTERNATIVE	17-58
	<b>T</b>	W.ED 437	ALL MOVE OF ALTERNAL FOR THE RUDIER CERTACNETICITES	
18.0			ALYSIS OF ALTERNATIVE FOR THE BURIED SEDIMENT/DITCHES	10 1
			UP	18-1
	18.1		SEDIMENTS SUBGROUP CHARACTERISTICS	18-2
	18.2		SEDIMENTS SUBGROUP EVALUATION OF	
			NATIVES	18-3
		18.2.1	Alternative 1/B1: No Additional Action	18-3
		18.2.2	Alternative 2/B2: Access Restrictions; Biota	
			Management	18-4
		18.2.3	Alternative 3/B3: Landfill	18-5
		18.2.4	Alternative 6/B5: Caps/Covers	18-6
		18.2.5	Alternative 6g/B5a: Caps/Covers with Consolidation	18-6
		18.2.6	Alternative 13a/B6: Direct Thermal Desorption	18-7
		18.2.7	Alternative 19a/B11a: In Situ Thermal Treatment	18-8
	18.3		SEDIMENTS SUBGROUP SELECTION OF PREFERRED	
	10.5		NATIVE	18-9
	18.4		CREEK LATERAL SUBGROUP CHARACTERISTICS	18-11
	18.5		CREEK LATERAL SUBGROUP EVALUATION OF	
	10.5		NATIVES	18-13
			Alternative 1/B1: No Additional Action	18-13
		18.5.1		18-15
		18.5.2	Alternative 3/B3: Landfill	
			Alternative 6g/B5a: Caps/Covers with Consolidation	
	40.5	18.5.4	Alternative 13a/B6: Direct Thermal Desorption	18-16
	18.6		CREEK LATERAL SUBGROUP SELECTION OF PREFERRED	40.4
		ALTER	NATIVE	18-17
10.0	DETA	TT TED AN	JALYSIS OF ALTERNATIVES FOR THE UNDIFFERENTIATED	
19.0			UP	19-1
			N 36 BALANCE OF AREAS SUBGROUP	13-1
	19.1			10.0
			CTERISTICS	19-2
	19.2		N 36 BALANCE OF AREAS SUBGROUP EVALUATION	
			TERNATIVES	19-3
		19.2.1	Alternative 1/B1/A1/U1: No Additional Action	19-4
		19.2.2	Alternative 2/B2/A1/U1: Institutional Controls	19-5
		19.2.3	Alternative 3/B3/A4/U4: Landfill	19-5
		19.2.4	Alternative 6/B5/A2/U2: Caps/Covers	19-7
		19.2.5	Alternative 6g/B5a/A4/U4: Caps/Covers with Consolidation	19-8
			<u> </u>	

		19.2.6 Alternative 13a/B6/A4/U4: Direct Thermal Desorption	
		19.2.7 Alternative 19a/B11b/A4/U4: In Situ Thermal Treatment	
	19.3	SECTION 36 BALANCE OF AREAS SUBGROUP SELECTION OF PREFERRE	D
		ALTERNATIVE	19-14
	19.4	BURIAL TRENCHES SUBGROUP CHARACTERISTICS	19-16
	19.5	BURIAL TRENCHES SUBGROUP EVALUATION OF	
		ALTERNATIVES	19-17
		19.5.1 Alternative 1/B1/A1/U1: No Additional Action	19-18
		19.5.2 Alternative 3/B3/A4/U4a: Landfill	19-18
		19.5.3 Alternative 6/B5/A2/U2: Caps/Covers	
		19.5.4 Alternative 10/B3/A4/U4a: Direct Solidification/Stabilization	
	19.6	BURIAL TRENCHES SUBGROUP SELECTION OF PREFERRED	
	22.0	ALTERNATIVE	19-23
20.0	Ot D. O	MADY OF PRETERRED ALTERNATIVE	20.1
20.0		MARY OF PREFERRED ALTERNATIVES	
	20.1	SOILS PREFERRED ALTERNATIVES	
	20.2	HUMAN HEALTH EXCEEDANCE CATEGORY	
		20.2.1 Access Restrictions and Sewer Plugging	
		20.2.2 On-Post Centralized Landfill	
		20.2.3 Thermal Desorption/Centralized Landfill	
		20.2.4 Clay/Soil Cap and Composite Cap	
		20.2.5 Consolidation as Grading Fill	
		20.2.6 Thermal Desorption/Consolidation	
		20.2.7 Thermal Desorption/Clay/Soil Cap	
		20.2.8 Solidification/Stabilization	
		20.2.9 Rotary Kiln Incineration	
		20.2.10 Soil Vapor Extraction	
	20.3	BIOTA EXCEEDANCE CATEGORY	
		20.3.1 Landfarm/Agricultural Practice	
		20.3.2 Consolidation as Grading Fill	
		20.3.3 On-Post Centralized Landfill	
		20.3.4 Clay/Soil Cap	
		20.3.5 No Additional Action	
	20.4	POTENTIAL AGENT PRESENCE CATEGORY	
		20.4.1 Clay/Soil Cap	
		20.4.2 Rotary Kiln Incineration	
	20.5	POTENTIAL UXO PRESENCE CATEGORY	
		20.5.1 Caps/Covers	
		20.5.2 Off-Post Detonation/Incineration	20-17
	20.6	MEDIA INTERACTIONS	20-18
	20.7	FACILITY SIZING	20-19
		20.7.1 Thermal Desorption	
		20.7.2 Incineration	20-21
		20.7.3 Landfill	
		20.7.4 Summary of Adjusted Costs	20-23
	20.8	SCHEDULING OF REMEDIAL ALTERNATIVES FOR SOILS	20-24
21.0	REFE	RENCES	21-1
***		17	
		VII – SOILS DAA (Appendices A and B) VOLUME AND AREA ESTIMATES	
AFFERN	UIA A	VOLUME AND AREA ESTIMATES	

AFFENDIA A VOLUME AND AREA ESTIMATES

APPENDIX B COST ESTIMATES FOR REMEDIAL ALTERNATIVES

		II – WATER DAA	
1.0	INTE		1-1
	1.1	BACKGROUND	1-1
	1.2		1-1
	1.3	CHANGES FROM THE WATER DSA	1-3
		1.3.1 Evaluation Criteria for On-post Groundwater	1-4
			1-5
			1-6
	1.4		1-7
	•••	ONCE THE DOCUMENT	1-,
2.0	GEN	AL DAA METHODOLOGY	2-1
	2.1		2-1
	2.2		2-1 2-2
	2.3		2-2 2-2
	2.3		2-2 2-3
	2.4		
	2.5		2-4
		•	2-4
			2-4
		2.5.3 Selection of Preferred Alternatives	2-4
2.0	CDO		
3.0		NDWATER CONTROL AND TREATMENT	
			3-1
	3.1		3-1
		· · · · · · · · · · · · · · · · · · ·	3-1
		•	3-2
			3-2
		<b>▲</b>	3-3
		3.1.5 South Plants Plume Group	3-3
	3.2	ESTIMATION OF CONCENTRATION AND MASS OF CONTAMINANTS	
		IN GROUNDWATER	3-3
			3-4
			3-5
			3-6
	3.3	THE USE OF GROUNDWATER MODELING IN THE EVALUATION OF	
	0.0	•	3-7
			J-1
4.0	NOR	WEST BOUNDARY PLUME GROUP	4-1
	4.1		4-1
	•••	4.1.1 Description of Alternative	4-1
			<del>4-</del> 1 4-2
	4.2		4-2 4-3
	4.2		
		•	4-3
		4.2.2 Analysis of Alternative	4-6
5.0	WES	RN PLUME GROUP	5-1
5.0	5.1		
	3.1		5-1
			5-1
			5-2
	5.2		5-4
			5-4
		5.2.2 Analysis of Alternative	5-6

6.0	NORTH BOUNDARY PLUME GROUP							
	6.1	ALTERNATIVE NC-1: NO ACTION	6-2					
		6.1.1 Description of Alternative	6-2					
		6.1.2 Analysis of Alternative	6-2					
	6.2	ALTERNATIVE NC-2: CONTINUED EXISTING ACTION	6-4					
		6.2.1 Description of Alternative	6-4					
		6.2.2 Analysis of Alternative	6-5					
	6.3	ALTERNATIVE NC-3/NT-2: INTERCEPTION, TREATMENT	0-5					
		AT NBCS	6-7					
		6.3.1 Description of Alternative	6-7					
		6.3.2 Analysis of Alternative	6-9					
	6.4	ALTERNATIVE NC-3/NT-3: INTERCEPTION, TREATMENT	0-9					
	0.1	1 T T 1 ATT 1 A 1 T T T T T T T T T T T	C 10					
			6-12					
			6-12					
	6.5	ALTERNATIVE NC-3/NT-4: INTERCEPTION,	6-13					
	0.5	•						
			6-16					
			6-17					
	6.6		6-18					
	0.0	ALTERNATIVE NC-6: CLAY/SOIL CAP	6-21					
			6-21					
		6.6.2 Analysis of Alternative	6-23					
7.0	BASIN A PLUME GROUP							
7.0	7.1	ALTERNATIVE AC-1: NO ACTION	7-1					
	7.1	7.1.1 Description of Alternative	7-2					
			7-2					
	7.2	7.1.2 Analysis of Alternative	7-3					
	1.2	7.2.1 Description of Alternative	7-5					
			7-5					
	7.3	7.2.2 Analysis of Alternative	7-7					
	1.3	STRIDDING/CODDITION						
		STRIPPING/SORPTION	7-8					
			7-8					
	7.4	7.3.2 Analysis of Alternative	7-13					
	7.4							
		STRIPPING/OXIDATION/SORPTION 7.4.1 Description of Alternative	7-17					
			7-17					
	75	That you of the final to the second of the s	7-19					
	7.5	ALTERNATIVE AC-7: CLAY/SOIL CAP 7.5.1 Description of Alternative	7-24					
			7-24					
		7.5.2 Analysis of Alternative	7-25					
8.0	SOIL	THE DIANTS DIAME COOLD						
0.0	8.1	TH PLANTS PLUME GROUP	8-1					
	0.1	ALTERNATIVE SPC-1: NO ACTION	8-3					
			8-3					
	8.2		8-3					
	0.2	ALTERNATIVE SPC-3/SPT-2: MASS REDUCTION, AIR						
		STRIPPING/SORPTION	8-5					
		8.2.1 Description of Alternative	8-5					
	0.3	8.2.2 Analysis of Alternative	8-9					
	8.3	ALTERNATIVE SPC-3/SPT-3: MASS REDUCTION,						
			3-13					
		8.3.1 Description of Alternative	1.1					

		8.3.2	Analysis of Alternative	8-15
•	8.4		NATIVE SPC-3/SPT-2/SPT-4: MASS REDUCTION, AIR	
		STRIPPI	NG/SORPTION, BIOLOGICAL REACTOR/SORPTION	8-20
		8.4.1	Description of Alternative	8-20
		8.4.2	Analysis of Alternative	8-21
	8.5	ALTERN	NATIVE SPC-3/SPT-3/SPT-4: MASS REDUCTION,	
		OXIDAT	TION/SORPTION, BIOLOGICAL REACTOR/SORPTION	8-25
		8.5.1	Description of Alternative	
		8.5.2	Analysis of Alternative	8-27
	8.6		NATIVE SPC-5/SPT-2/SPT-5: MASS REDUCTION,	
		STRIPPI	NG/SORPTION, IN SITU BIODEGRADATION	8-31
		8.6.1	Description of Alternative	8-31
		8.6.2	Analysis of Alternative	8-33
	8.7	ALTERN	NATIVE SPC-6/SPT-2/SPT-5: MASS REDUCTION/	
		DEWAT	ERING, STRIPPING/SORPTION, IN SITU	
		BIODEG	GRADATION	8-36
		8.7.1	Description of Alternative	8-37
		8.7.2	Analysis of Alternative	8-40
	8.8	ALTERN	NATIVE SPC-6/SPT-3/SPT-5: MASS REDUCTION/	
			TERING, OXIDATION/SORPTION, IN SITU	
		BIODEC	GRADATION	8-44
		8.8.1	Description of Alternative	8-45
		8.8.2	Analysis of Alternative	8-46
	8.9		NATIVE SPC-7/SPT-2/SPT-5: MASS REDUCTION/	
			TERING/CAP, STRIPPING/SORPTION, IN SITU	
		BIODEC	GRADATION	8-51
		8.9.1	Description of Alternative	8-51
		8.9.2	Analysis of Alternative	8-52
	8.10		NATIVE SPC-7/SPT-3/SPT-5: MASS REDUCTION/	
			TERING/CAP, OXIDATION/SORPTION, IN SITU	
		BIODEC	GRADATION	8-57
		8.10.1	Description of Alternative	8-58
		8.10.2	Analysis of Alternative	8-59
9.0	COM	PARATIV	'E ANALYSIS OF ALTERNATIVES	9-1
7.0	9.1		WEST BOUNDARY PLUME GROUP	9-1
	7.1	9.1.1	Overall Protection of Human Health and	
		7.1.1	the Environment	9-1
		9.1.2	Compliance with ARARs	9-2
		9.1.3	Long-Term Effectiveness and Permanence	9-2
		9.1.4	Reduction of TMV	9-2
		9.1.5	Short-Term Effectiveness	9-2
		9.1.6	Implementability	9-3
		9.1.7	Costs	9-3
		9.1.8	Selection of Preferred Alternatives	9-3
	9.2	WESTE	RN PLUME GROUP	9-3
	٠.2	9.2.1	Overall Protection of Human Health and the Environment	9-4
		9.2.2	Compliance with ARARs	9-4
		9.2.3	Long-Term Effectiveness and Permanence	9-4
		9.2.4	Reduction of TMV	9-4
		9.2.5	Short-Term Effectiveness	9-4
		9.2.6	Implementability	9-5
		9.2.7	Costs	9-5
		··		

		9.2.8	Selection of Preferred Alternatives	9-3
	9.3	NORTH I	BOUNDARY PLUME GROUP	9-6
		9.3.1	Overall Protection of Human Health and the Environment	9-6
		9.3.2	Compliance with ARARs	9-7
		9.3.3	Long-Term Effectiveness and Permanence	9-7
		9.3.4	Reduction of TMV	9-8
		9.3.5	Short-Term Effectiveness	9-9
		9.3.6	Implementability	9-9
		9.3.7	Costs	9-10
			Selection of Preferred Alternatives	9-10
	0.4	9.3.8		9-10
	9.4		PLUME GROUP	9-10
		9.4.1	Overall Protection of Human Health and the Environment	
		9.4.2	Compliance with ARARs	9-11
		9.4.3	Long-Term Effectiveness and Permanence	9-11
		9.4.4	Reduction of TMV	9-12
		9.4.5	Short-Term Effectiveness	9-13
		9.4.6	Implementability	9-14
		9.4.7	Costs	9-15
		9.4.8	Selection of Preferred Alternatives	9-15
	9.5	SOUTH I	PLANTS PLUME GROUP	9-16
		9.5.1	Overall Protection of Human Health and	
			the Environment	9-16
		9.5.2	Compliance with ARARs	9-18
		9.5.3	Long-Term Effectiveness and Permanence	9-18
		9.5.4	Reduction of TMV	9-20
		9.5.5	Short-Term Effectiveness	9-22
				9-23
		9.5.6	Implementability	9-23
		9.5.7	Costs	9-24
		9.5.8	Selection of Preferred Alternatives	9-24
10.0	COM	BINED BA	SIN A/SOUTH PLANTS TREATMENT PLANT	10-1
11.0	REFE	RENCES	·	11-1
	,		DETEN 64 TIPES	
APPENT	OLX A	COST ES	STIMATES	
VOLUM	E VI of	VII – STR	RUCTURES DAA	
1.0			N	1-1
	1.1		URES MEDIUM GROUPS	1-1
	1.2		AL ALTERNATIVES	1-2
2.0	DAA	METHOD	OLOGY FOR THE STRUCTURES MEDIUM	2-1
	2.1		E AND AREA ESTIMATES	2-1
	2.2	DESCRI	PTION AND ANALYSIS OF REMEDIAL ALTERNATIVES	2-2
		2.2.1	Alternative Descriptions	2-2
		2.2.2	Detailed Analysis of Alternatives	2-3
		2.2.2	Ongoing Actions Affecting Structures Remedial Alternatives	2-3
	2.3		INTERACTIONS	2-3
			URES SAMPLING	2-4 2-5
	2.4	SIKUCI	UKES SAIVIFEING	2-3
3.0	CTDI	ירידו וסבפי	MEDIUM GROUPS	3-1
3.0				3-1
	3.1		UCTION	
	3.2	BACKG	ROUND INFORMATION	3-1

	3.3	STRUCTURES DAA MEDIUM GROUPS	3-2
		3.3.1 Future Use, No Potential Exposure	3-2
		3.3.2 No Future Use, Nonmanufacturing History	3-2
		3.3.3 No Future Use, Manufacturing History	3-2
		3.3.4 No Future Use, Agent History	3-3
	3.4	STRUCTURAL MATERIAL QUANTITY ESTIMATES	3-5
	3.5	ESTIMATES OF SALVAGEABLE MATERIALS	3-7
4.0	FUT	URE USE, NO POTENTIAL EXPOSURE	4-1
	4.1	ALTERNATIVE 1: NO ACTION	4-1
		4.1.1 Description of Alternative	4-1
		4.1.2 Analysis of Alternative	4-1
5.0	NO I	FUTURE USE, NONMANUFACTURING HISTORY	5-1
	5.1	ALTERNATIVE 1: NO ACTION	5-1
		5.1.1 Description of Alternative	5-1
		5.1.2 Analysis of Alternative	5-1
6.0	NO I	FUTURE USE, MANUFACTURING HISTORY-PROCESS HISTORY SUBGROUP	6-1
	6.1	ALTERNATIVE 1: NO ACTION	6-2
		6.1.1 Description of Alternative	6-2
		6.1.2 Analysis of Alternative	6-2
	6.2	ALTERNATIVE 2: SALVAGE, PIPE PLUGS, LOCKS/BOARDS/	
		FENCES/SIGNS	6-3
		6.2.1 Description of Alternative	6-3 6-4
		6.2.2 Analysis of Alternative	6-4 6-6
	6.3	GENERAL ALTERNATIVE: DEMOLITION, CONTAINMENT	6-7
		6.3.1 Description of Alternative	6-8
		6.3.2 Analysis of Alternative	0-0
	6.4	ALTERNATIVE 8: HOT GAS, DISMANTLING, SALVAGE, ON-POST NONHAZARDOUS WASTE LANDFILL	6-10
		6.4.1 Description of Alternative	6-10
		6.4.2 Analysis of Alternative	6-11
	6.5	ALTERNATIVE 9: VACUUM DUSTING, DISMANTLING, SALVAGE,	0 11
	0.5	ON-POST NONHAZARDOUS WASTE LANDFILL	6-13
		6.5.1 Description of Alternative	6-13
		6.5.2 Analysis of Alternative	6-13
	6.6	ALTERNATIVE 9a: STEAM CLEANING, DISMANTLING, SALVAGE,	
		ON-POST NONHAZARDOUS WASTE LANDFILL	6-15
		6.6.1 Description of Alternative	6-15
		6.6.2 Analysis of Alternative	6-16
	6.7	ALTERNATIVE 10: SAND BLASTING, DISMANTLING, SALVAGE,	
		ON-POST NONHAZARDOUS WASTE LANDFILL	6-17
		6.7.1 Description of Alternative	6-17
		6.7.2 Analysis of Alternative	6-18
	6.8	ALTERNATIVE 12: DISMANTLING, SALVAGE, OFF-POST	
		ROTARY KILN INCINERATION, OFF-POST HAZARDOUS WASTE LANDFILL	6-19
		6.8.1 Description of Alternative	6-19
		6.8.2 Analysis of Alternative	6-20
	6.9	ALTERNATIVE 13: DISMANTLING, SALVAGE, ON-POST	
		ROTARY KILN INCINERATION, ON-POST NONHAZARDOUS	,
		WASTE LANDFILL	6-22
		6.9.1 Description of Alternative	6-22

		6.9.2 Analysis of Alternative	6-22
	6.10	ALTERNATIVE 19: DISMANTLING, SALVAGE, ON-POST	
		HAZARDOUS WASTE LANDFILL	6-23
		6.10.1 Description of Alternative	6-23
		6.10.2 Analysis of Alternative	6-24
	6.11	ALTERNATIVE 20: DISMANTLING, SALVAGE, OFF-POST	
	0.11	HAZARDOUS WASTE LANDFILL	6-25
		6.11.1 Description of Alternative	6-25
		6.11.2 Analysis of Alternative	6-25
	6.12	ALTERNATIVE 21: DISMANTLING, SALVAGE,	0 23
	0.12	CLAY CAP	6-26
			6-26
		6.12.1 Description of Alternative	6-27
		6.12.2 Analysis of Alternative	0-27
	6.13	ALTERNATIVE 21a: DISMANTLING, SALVAGE,	
		CONSOLIDATION	6-28
		6.13.1 Description of Alternative	6-28
		6.13.2 Analysis of Alternative	6-29
7.0		UTURE USE, MANUFACTURING HISTORY-NON-PROCESS	
		ORY SUBGROUP	7-1
	7.1	ALTERNATIVE 1: NO ACTION	7-2
		7.1.1 Description of Alternative	7-2
		7.1.2 Analysis of Alternative	7-2
	7.2	ALTERNATIVE 2a: LOCKS/BOARDS/FENCES/SIGNS	7-3
		7.2.1 Description of Alternative	7-3
		7.2.2 Analysis of Alternative	7-3
	7.3	ALTERNATIVE 19a: DISMANTLING, SALVAGE, ON-POST	
		NONHAZARDOUS WASTE LANDFILL	7-5
		7.3.1 Description of Alternative	7-5
		7.3.2 Analysis of Alternative	7-6
	7.4	ALTERNATIVE 20a: DISMANTLING, SALVAGE, OFF-POST	
	,	NONHAZARDOUS WASTE LANDFILL	7-7
		7.4.1 Description of Alternative	7-7
		7.4.2 Analysis of Alternative	7-7
	7.5	ALTERNATIVE 21: DISMANTLING, SALVAGE, CLAY CAP	7-8
	1.5	7.5.1 Description of Alternative	7-8
		•	7-9
	7.	7.5.2 Analysis of Alternative	7-10
	7.6		
		7.6.1 Description of Alternative	7-10
		7.6.2 Analysis of Alternative	7-10
8.0	NO E	TUTURE USE, AGENT HISTORY MEDIUM GROUP	8-1
6.0		ALTERNATIVE 1: NO ACTION	8-3
	8.1		8-3
		8.1.1 Description of Alternative	
		8.1.2 Analysis of Alternative	8-3
	8.2	ALTERNATIVE 4: HOT GAS, DISMANTLING, ON-POST	
		HAZARDOUS WASTE LANDFILL	8-4
		8.2.1 Description of Alternative	8-4
		8.2.2 Analysis of Alternative	8-4
	8.3	ALTERNATIVE 6: HOT GAS, DISMANTLING, ON-POST ROTARY	
		KILN INCINERATION, ON-POST NONHAZARDOUS WASTE	
		LANDFILL	8-6
		8.3.1 Description of Alternative	8-6

	8.4		Analysis of Alternative	8-6
		WASTE	LANDFILL	8-8
		8.4.1	Description of Alternative	8-8
		8.4.2	Analysis of Alternative	8-9
	8.5		NATIVE 15: DISMANTLING, ON-POST ROTARY KILN	
		INCINE	RATION, ON-POST NONHAZARDOUS WASTE LANDFILL	8-10
		8.5.1	Description of Alternative	8-10
		8.5.2	Analysis of Alternative	8-10
	8.6		NATIVE 17: DISMANTLING, HOT GAS, ON-POST	
		HAZAR	DOUS WASTE LANDFILL	8-12
		8.6.1	Description of Alternative	8-12
		8.6.2	Analysis of Alternative	8-12
	8.7		NATIVE 18: DISMANTLING, PEROXIDE/HYPOCHLORITE TREATMENT,	
		ON-POS	ST HAZARDOUS WASTE LANDFILL	8-14
		8.7.1	Description of Alternative	8-14
		8.7.2	Analysis of Alternative	8-15
	8.8		NATIVE 18a: SAND BLASTING, DISMANTLING, PEROXIDE/HYPOCHLORI	
		TREAT	MENT, ON-POST HAZARDOUS WASTE LANDFILL	8-16
		8.8.1	Description of Alternative	8-16
		8.8.2	Analysis of Alternative	8-17
9.0	COM		'E ANALYSIS OF ALTERNATIVES	9-1
	9.1		TURE USE, MANUFACTURING HISTORY-PROCESS	
		HISTOR	RY SUBGROUP	9-1
		9.1.1	Overall Protection of Human Health and	
			the Environment	9-1
		9.1.2	Compliance with ARARs	9-1
		9.1.3	Long-Term Effectiveness and Permanence	9-1
		9.1.4	Reduction of TMV	9-2
		9.1.5	Short-Term Effectiveness	9-3
		9.1.6	Implementability	9-3
		9.1.7	Cost	9-4
	9.2		TURE USE, MANUFACTURING HISTORY-NON-PROCESS	
		HISTOR	RY SUBGROUP	9-4
		9.2.1	Overall Protection of Human Health and	
			the Environment	9-5
		9.2.2	Compliance with ARARs	9-5
		9.2.3	Long-Term Effectiveness and Permanence	9-5
		9.2.4	Reduction of TMV	9-6
		9.2.5	Short-Term Effectiveness	9-6
		9.2.6	Implementability	9-7
		9.2.7	Cost	9-7
	9.3	NO FU	TURE USE-AGENT HISTORY MEDIUM GROUP	9-7
		9.3.1	Overall Protection of Human Health and the Environment	9-7
		9.3.2	Compliance with ARARs	9-7 9-8
		9.3.2 9.3.3	Long-Term Effectiveness and Permanence	9-8
		9.3.3 9.3.4	Reduction of TMV	9-8
		9.3.4 9.3.5	Short-Term Effectiveness	9-9
				9-10
		9.3.6	Implementability	9-10
		9.3.7	Cost	7-10

	9.4	9.4.1 No Future Use, Manufacturing History-Process History Subgroup	9-11 9-11 9-11
		9.4.3 No Future Use, Agent History Medium Group	9-12
	9.5	RISK MANAGEMENT ISSUES	9-12
	9.6	SUMMARY OF PREFERRED ALTERNATIVES FOR THE STRUCTURES MEDIUM.	9-13
		9.6.1 Cost	9-14
4		9.6.2 Phasing	9-15
10.0	REFE	RENCES CONSULTED	10-1
APPENI	OIX A	MEDIUM GROUP STRUCTURES LISTS	
APPENI	OIX B	ESTIMATES OF STRUCTURAL MATERIAL VOLUMES	
APPENI	OIX C	COSTS	
VOLUM	E VII o	f VII – TECHNOLOGY DESCRIPTIONS	
1.0		ODUCTION	1-1
2.0	NO. A	ACTION	2-1
2.0	2.1	THE NO ACTION ALTERNATIVE	2-1
	2.1	2.1.1 No Action Alternative for Soils Medium	2-1
		2.1.2 No Action Alternative for the Water Medium	2-2
		2.1.3 No Action Alternative for Structures	2-2
	2.2	THE CONTINUED EXISTING ACTION ALTERNATIVE	2-3
3.0	INST	ITUTIONAL CONTROLS	3-1
5.0	3.1	PROCESS DESCRIPTION	3-3
	J.1	3.1.1 Access Restrictions	3-3
		3.1.2 Public Education	3-4
		3.1.3 Pre- and Post-Treatment Requirements	3-5
		3.1.4 Sidestream Generation	3-5
		3.1.5 Results From Other Sites	3-5
	3.2	PROCESS PERFORMANCE	3-5
		3.2.1 Effectiveness	3-5
•		3.2.2 Limitations	3-6
		3.2.3 Cost Summary	3-7
4.0	FXC	AVATION, DEMOLITION, AND TRANSPORTATION	4-1
4.0	4.1	EXCAVATION	4-1
	7.1	4.1.1 Process Description	4-1
		4.1.2 Process Performance	4-8
	4.2	STRUCTURES DEMOLITION	4-10
		4.2.1 Process Description	4-11
		4.2.2 Process Performance	4-11
	4.3	TRANSPORTATION	4-12
		4.3.1 Process Description	4-12
		4.3.2 Process Performance	4-15
5.0	GRO	UNDWATER EXTRACTION/REINJECTION	5-1
5.0	5.1	OVERVIEW OF PROCESS	5-1
		5.1.1 Process Description	5-3
		<u> </u>	

		5.1.2	Process Performance	5-4				
6.0	CONTAINMENT							
	6.1		SOIL COVER	6-1				
		6.1.1	Process Description	6-1				
		6.1.2	Process Performance	6-3				
	6.2		SOIL CAP	6-3				
	0.2	6.2.1	Alternative Components	6-4				
		6.2.2	Factors Determining Alternative Performance	6-7				
	6.3		Y WALL	6-7				
	0.5	6.3.1	Process Description	6-7				
		6.3.2	Process Performance	6-10				
	6.4		OSITE CAPS	6-10				
	0.4	6.4.1	Process Description	6-11				
		6.4.2	Factors Determining Alternative Performance	6-14				
	6.5		ST LANDFILL	6-15				
	0.5	6.5.1	On-Post Hazardous Waste Landfill	6-16				
		6.5.2	Solid Waste Landfill Cell	6-21				
		6.5.3	Construction of On-Post Landfill Facility	6-24				
	6.6		OST LANDFILL	6-24				
	0.0	6.6.1	Process Description	6-25				
		6.6.2	Process Performance	6-27				
		0.0.2	1100000 1 official of the first the					
7.0	DIRE	ECT THE	RMAL TREATMENT	7-1				
	7.1		MAL DESORPTION	7-1				
		7.1.1	Process Description	7-2				
		7.1.2	Process Performance	7-7				
	7.2		ERATION/PYROLYSIS	7-11				
	7.2	7.2.1	Process Description	7-11				
		7.2.2	Process Performance	7-17				
	7.3		OST INCINERATION OF STRUCTURAL DEBRIS	7-19				
	,	7.3.1	Process Description	7-19				
		7.3.2	Process Performance	7-21				
		,						
8.0	IN S	ITU THE	RMAL TREATMENT	8-1				
	8.1	SURFA	ACE SOIL HEATING	8-1				
		8.1.1	Process Description	8-2				
		8.1.2	Process Performance	8-4				
	8.2	SUBSU	JRFACE SOIL HEATING	8-6				
		8.2.1	Radio Frequency Heating	8-7				
	8.3	IN SIT	U VITRIFICATION	8-12				
		8.3.1	Process Description	8-13				
		8.3.2	Process Performance	8-16				
	8.4	HOT G	GAS DECONTAMINATION OF STRUCTURES AND					
		STRUC	CTURAL DEBRIS	8-17				
		8.4.1	Process Description	8-17				
		8.4.2	Process Performance	8-19				
9.0	AGE		TREATMENT	9-1				
	9.1	ON-PO	OST UXO DEMILITARIZATION	9-2				
		9.1.1	Process Description	9-3				
		9.1.2	Process Performance	9-5				
	9.2	OFF-PO	OST DEMILITARIZATION OF UXO	9-6				

		9.2.1	Process Description	9-0		
		9.2.2	Process Performance	9-8		
	9.3		WASHING OF AGENT-CONTAMINATED SOIL OR			
			JRAL DEBRIS	9-8		
		9.3.1	Process Description	9-8		
		9.3.2	Process Performance	9-11		
	9.4		WASHING/SOLVENT EXTRACTION OF			
	<i>.</i>		CONTAMINATED SOILS	9-11		
		9.4.1	Process Description	9-12		
		9.4.2	Process Performance	9-13		
	9.5		ATION OF AGENT-CONTAMINATED SOIL			
	7.5	9.5.1	Process Description	9-14		
		9.5.2	Process Performance	9-16		
		7.5.2	1100055 1 Citofinance			
10.0	SOLI	DIFICATIO	N/STABILIZATION	10-1		
10.0	10.1	DIPECT	CEMENT-BASED SOLIDIFICATION	10-1		
	10.1	10.1.1	Process Description	10-3		
		10.1.1	Process Performance	10-6		
	10.2		PROPRIETARY AGENT SOLIDIFICATION	10-7		
	10.2	10.2.1	Process Description	10-8		
		10.2.1	Process Performance	10-9		
	10.2		CEMENT-BASED SOLIDIFICATION	10-10		
	10.3	10.3.1	Process Description	10-11		
			Process Performance	10-13		
	10.4	10.3.2	PROPRIETARY AGENT SOLIDIFICATION	10-14		
	10.4		Process Description	10-14		
		10.4.1		10-14		
		10.4.2	Process Performance	10-15		
	BIOLOGICAL TREATMENT					
11.0		OGICAL I	LTURAL PRACTICES (LANDFARMING)	11-1		
	11.1		Process Description	11-2		
		11.1.1		11-3		
		11.1.2	Process Performance	11-4		
	11.2		ED-BED BIOLOGICAL REACTOR FOR GROUND WATER TREATMENT	11-4		
		11.2.1	Process Description	11-5		
		11.2.2	Process Performance	11-5		
	11.3		AEROBIC BIODEGRADATION	11-6		
		11.3.1	Process Description			
		11.3.2	Process Performance	11-7		
	11.4	•	BIOTREATMENT OF LAKE SEDIMENTS	11-9 11-9		
		11.4.1	Process Description			
		11.4.2	Process Performance	11-11		
			DD O CTIGATA	12.1		
12.0			PROCESSES	12-1		
	12.1		SOIL WASHING (SOLUTION WASHING)	12-1		
		12.1.1	Process Description	12-2		
		12.1.2	Process Performance	12-4		
	12.2		USHING	12-5		
		12.2.1	Process Description			
		12.2.2	Process Performance			
	12.3	SOIL VA	APOR EXTRACTION			
		12.3.1	Process Description			
		12.3.2	Process Performance			
	124	SOLVEN	JT EXTRACTION	12-15		

		12.4.1	Process Description	12-16	
		12.4.2	Process Performance	12-17	
13.0	STRUCTURES UNIQUE PROCESSES				
	13.1	PIPE PL	UGGING	13-1	
		13.1.1	Process Description	13-2	
		13.1.2	Process Performance	13-3 13-4	
	13.2 VACUUM DUSTING				
		13.2.1	Process Description	13-4	
		13.2.2	Process Performance	13-5	
	13.3	SAND I	BLASTING	13-6	
		13.3.1	Process Description	13-7	
		13.3.2	Process Performance	13-7	
	13.4	STEAM	CLEANING	13-9	
		13.4.1	Process Description	13-9	
		13.4.2	Process Performance	13-10	
	13.5	SALVA	GE	13-11	
		13.5.1	Process Description	13-11	
		13.5.2	Process Performance	13-12	
14.0	WATER/LIQUID SIDESTREAM TREATMENT				
	14.1	CHEMI	CAL OXIDATION	14-1	
		14.1.1	Process Description	14-1	
		14.1.2	Process Performance	14-4	
	14.2	GRANU	JLAR ACTIVATED CARBON ADSORPTION	14-7	
		14.2.1	Process Description	14-7	
		14.2.2	Process Performance	14-9	
	14.3	AIR ST	RIPPING	14-11	
		14.3.1	Process Description		
		14.3.2	Process Performance	14-13	
15.0	AIR TREATMENT				
	15.1		ON TREATMENT SUMMARY	15-1	
	15.2	EVALU	ATION OF TREATMENT TECHNOLOGIES FOR THE		
		TREAT	MENT OF AIR STRIPPER OFF-GAS	15-2	
APPEN	DIX A	ACTIO	N-SPECIFIC APPLICABLE OR RELEVANT		

AND APPROPRIATE REQUIREMENTS (ARARs)

#### LIST OF TABLES

	E I of VII - EXECUTIVE SUMMARY
ES5.4-1	Preferred Alternatives for the Soils Medium
ES6.4-1	Preferred Alternatives for the Water Medium
ES7.4-1	Preferred Alternatives for the Structures Medium
	E II of VII - SOILS DAA (Sections 1 through 12)
1.4-1	Soils Site Evaluation Criteria and Preliminary Remediation Goals (in ppm)
1.5-1	Soils Exceedance Categories, Medium Groups, and Subgroups
3.1-1	Summary of Medium Groups and Subgroups
4.0-1	Description of Soils Alternatives
5.0-1	Characteristics of the Munitions Testing Medium Group
5.1-1	Frequency of Detections for the Munitions Testing Medium Group
5.2-1	Evaluation of Alternative U1: No Additional Action (Provisions of FFA)
	for the Munitions Testing Medium Group
5.2-2	Evaluation of Alternative U2: Caps/Covers (Soil Cover) for the Munitions
	Testing Medium Group
5.2-3	Evaluation of Alternative U3a: Detonation (On-Post Detonation) for the
	Munitions Testing Medium Group
5.2-4	Evaluation of Alternative U4a: Detonation (Off-Post Army Facility) for the
	Munitions Testing Medium Group
6.0-1	Characteristics of Agent Storage Medium Group
6.1-1	
6.1-2	·
6.2-1	
0.2 1	North Plants Subgroup
6.2-2	
0.2 2	Subgroup
6.2-3	
0.2 3	Post Landfill) for the North Plants Subgroup
6.2-4	
0.2 .	Plants Subgroup
6.2-5	
0.2-3	Post Landfill) for the North Plants Subgroup
6.4-1	recommendation of the commendation of the comm
6.4-2	· · · · · · · · · · · · · · · · · · ·
6.5-1	
0.5-1	Toxic Storage Yards Subgroup
6.5-2	
0.5-2	Yards Subgroup
6.5-3	· · · · · · · · · · · · · · · · · · ·
0.3-3	Post Landfill) for the Toxic Storage Yards Subgroup
( = 1	· · · · · · · · · · · · · · · · · · ·
6.5-4	
	for the Toxic Storage Yards Subgroup
6.5-5	
	Post Landfill) for the Toxic Storage Yards Subgroup
7.0-1	
7.1-1	
7.1-2	
7.2-1	
	Lake Sediments Medium Group

7.2-2	Evaluation of Alternative B1a: Caps/Covers (Clay/Soil Cap) with Consolidation No Additional Action (Provisions of FFA) for the Lake Sediments Medium Group
7.2-3	Evaluation of Alternative B3: Landfill (On-Post Landfill) for the Lake Sediments Medium Group
7.2-4	Evaluation of Alternative B6: Direct Thermal Desorption (Direct Heating) for the Lake Sediments Medium Group
7.2-5	Evaluation of Alternative B10: Caps/Covers (Clay/Soil Cap) with Consolidation In Situ Biological Treatment (Aerobic Biodegradation) for the Lake Sediments Medium Group
8.0-1	Characteristics of the Surficial Soils Medium Group
8.1-1	Summary of Concentrations for the Surficial Soils Medium Group
8.1-2	Frequency of Detections for Surficial Soils Medium Group
8.2-1	Evaluation of Alternative B1: No Additional Action (Provisions of FFA) for the Surficial Soils Medium Group
8.2-2	Evaluation of Alternative B3: Landfill (On-Post Landfill) for the Surficial Soils Medium Group
8.2-3	Evaluation of Alternative B9: In Situ Biological Treatment
	(Landfarm/Agricultural Practice) for the Surficial Soils Medium Group
8.2-4	Evaluation of Alternative B11: In Situ Thermal Treatment (Surface Soil Heating) for the Surficial Soils Medium Group
9.0-1	Characteristics of the Ditches/Drainage Areas Medium Group
9.1-1	Summary of Concentrations for the Ditches/Drainage Areas Medium Group
9.1-2	Frequency of Detections for Ditches/Drainage Areas Medium Group
9.2-1	Evaluation of Alternative B1: No Additional Action (Provisions of FFA) for the Ditches/Drainage Areas Medium Group
9.2-2	Evaluation of Alternative B2: Biota Management (Exclusion, Habitat Modification) for the Ditches/Drainage Areas Medium Group
9.2-3	Evaluation of Alternative B3: Landfill (On-Post Landfill) for the Ditches/Drainage Areas Medium Group
9.2-4	Evaluation of Alternative B5a: Caps/Covers (Clay/Soil Cap) with Consolidation for the Ditches/Drainage Areas Medium Group
9.2-5	Evaluation of Alternative B6: Direct Thermal Desorption (Direct Heating) for the Ditches/Drainage Areas Medium Group
9.2-6	Evaluation of Alternative B9: In Situ Biological Treatment (Landfarm/Agricultural Practice) for the Ditches/Drainage Areas Medium Group
10.0-1	Characteristics of Basin A Medium Group
10.1-1	Summary of Concentrations for the Basin A Medium Group
10.1-2	Frequency of Detections for Basin A Medium Group
10.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Basin A Medium Group
10.2-2	Evaluation of Alternative 1a: Direct Thermal Desorption (Direct Heating) of Principal Threat Volume; No Additional Action (Provisions of FFA) for the Basin A Medium Group
10.2-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Basin A Medium Group
10.2-4	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the Basin A Medium Group
10.2-5	Evaluation of Alternative 6f: Direct Thermal Desorption (Direct Heating) of Principal Threat Volume; Caps/Covers (Clay/Soil Cap) for the Basin A Medium Group

10.2-6	Evaluation of Alternative 8: Direct Soil Washing (Solvent Washing); Direct Solidification/Stabilization (Cement-Based Solidification) for the Basin A Medium Group
10.2-7	Evaluation of Alternative 13: Direct Thermal Desorption (Direct Heating); Direct Solidification/Stabilization (Cement-Based Solidification) for the Basin A
	Medium Group
10.2-8	Evaluation of Alternative 17: In Situ Physical/Chemical Treatment (Soil Flushing); In Situ Thermal Treatment (Surface Soil Heating) for the Basin A
10.2-9	Medium Group Evaluation of Alternative 19: In Situ Thermal Treatment (RF)/Microwave Heating); In Situ Solidification/Stabilization (Cement-Based Solidification) for the Basin A Medium Group
11.0-1	Characteristics of the Basin F Wastepile Medium Group
11.1-1	Summary of Concentrations for the Basin F Wastepile Medium Group
11.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Basin F Wastepile Medium Group
11.2-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the Basin F Wastepile Medium Group
11.2-3	Evaluation of Alternative 6e: Caps/Covers (Composite Cap) for the Basin F Wastepile Medium Group
11.2-4	Evaluation of Alternative 8a: Direct Soil Washing (Solution Washing) for the Basin F Wastepile Medium Group
11.2-5	Evaluation of Alternative 9a: Direct Soil Washing (Solution Washing); Direct Thermal Desorption (Direct Heating) for the Basin F Wastepile Medium Group
11.2-6	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for the Basin F Wastepile Medium Group
12.0-1	Characteristics of the Secondary Basins Medium Group
12.1-1	Summary of Concentrations for the Secondary Basins Subgroup
12.1-2	Frequency of Detections for Secondary Basins Subgroup
12.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Secondary Basins Subgroup
12.2-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the Secondary Basins Subgroup
12.2-3	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the Secondary Basins Subgroup
12.2-4	Evaluation of Alternative 6g: Caps/Covers (Clay/Soil Cap) with Consolidation for the Secondary Basins Subgroup
12.2-5	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for the Secondary Basins Subgroup
12.2-6	Evaluation of Alternative 19a: In Situ Thermal Treatment (RF/Microwave Heating) for the Secondary Basins Subgroup
12.4-1	Summary of Concentrations for the Former Basin F Subgroup
12.4-2	Frequency of Detections for Former Basin F Subgroup
12.5-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Former Basin F Subgroup
12.5-2	Evaluation of Alternative 1a: Direct Thermal Desorption (Direct Heating) of Principal Threat Volume; No Additional Action (Provisions of FFA) for the
12.5-3	Former Basin F Subgroup  Evaluation of Alternative 2a: Direct Thermal Desorption (Direct Heating) of Principal Threat Volume; Access Restrictions (Modifications to FFA) for the Former Basin F Subgroup

12.5	5-4	Evaluation of Alternative 6c: Direct Thermal Desorption (Direct Heating) of Principal Threat Volume; Caps/Covers (Clay/Soil Cap) with Modifications to
		Existing System for the Former Basin F Subgroup
12.5	5-5	Evaluation of Alternative 6d: Caps/Covers (Clay/Soil Cap) with Modifications
12	<i>5 5</i>	to Existing System for the Former Basin F Subgroup
12.5	5_6	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
12	J- <b>U</b>	the Former Basin F Subgroup
12.5	5 7	Evaluation of Alternative 19a: In Situ Thermal Treatment (RF/Microwave
12	J <b>-</b> 1	Heating) for the Former Basin F Subgroup
12.	7 1	Summary of Concentrations for the Basin F Exterior Subgroup
		Frequency of Detections for Basin F Exterior Subgroup
12.		Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
12.	0-1	Basin F Exterior Subgroup
12.	8-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the
12.	· •	Basin F Exterior Subgroup
12.	8-3	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the Basin F
/	0 0	Exterior Subgroup
12.	<b>8_4</b>	Evaluation of Alternative 6g: Caps/Covers (Clay/Soil Cap) with Consolidation
12.	0-4	for the Basin F Exterior Subgroup
12	8-5	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
12.	0.2	the Basin F Exterior Subgroup
12.	<b>8</b> _6	Evaluation of Alternative 19b: In Situ Thermal Treatment (RF/Microwave
12.	0-0	Heating, Surface Soil Heating) for the Basin F Exterior Subgroup
		riouting, buriand both riouting, for the passer a second assert
VO	LUME III	of VII - SOILS DAA (Section 13 through 21)
13.		Characteristics of the Sewer Systems Medium Group
13.	1-1	Summary of Concentrations for the Sanitary/Process Water Sewers Subgroup
13.	1-2	Frequency of Detections for Sanitary/Process Water Sewers Subgroup
13.	2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
		Sanitary/Process Water Sewers Subgroup
13.	2-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the
		Sanitary/Process Water Sewers Subgroup
13.	2-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Sanitary/Proces
		Water Sewers Subgroup
13.	2-4	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
		the Sanitary/Process Water Sewers Subgroup
13.	4-1	Summary of Concentrations for the Chemical Sewers Subgroup
13.	4-2	Frequency of Detections for Chemical Sewers Subgroup
13.	5-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
		Chemical Sewers Subgroup
13.	5-2	Evaluation of Alternative 1a: Direct Thermal Desorption (Direct Heating) of
		Principal Threat Volume; No Additional Action (Provisions of FFA) for the
		Principal Threat Volume; No Additional Action (Provisions of FFA) for the Chemical Sewers Subgroup
13.	.5-3	<del></del>
13.	.5-3	Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the
		Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the Chemical Sewers Subgroup
	5-3 5-4	Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the Chemical Sewers Subgroup Evaluation of Alternative 2a: Direct Thermal Desorption (Direct Heating);
13.	5-4	Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the Chemical Sewers Subgroup Evaluation of Alternative 2a: Direct Thermal Desorption (Direct Heating); Access Restrictions (Modifications to FFA) for the Chemical Sewers Subgroup
13.		Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the Chemical Sewers Subgroup Evaluation of Alternative 2a: Direct Thermal Desorption (Direct Heating); Access Restrictions (Modifications to FFA) for the Chemical Sewers Subgroup Evaluation of Alternative 3a: Direct Thermal Desorption (Direct Heating) of
13.	5-4	Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the Chemical Sewers Subgroup Evaluation of Alternative 2a: Direct Thermal Desorption (Direct Heating); Access Restrictions (Modifications to FFA) for the Chemical Sewers Subgroup Evaluation of Alternative 3a: Direct Thermal Desorption (Direct Heating) of Principal Threat Volume; Landfill (On-Post Landfill) for the Chemical Sewers
13. 13.	5-4	Chemical Sewers Subgroup Evaluation of Alternative 2: Access Restrictions (Modifications to FAA) for the Chemical Sewers Subgroup Evaluation of Alternative 2a: Direct Thermal Desorption (Direct Heating); Access Restrictions (Modifications to FFA) for the Chemical Sewers Subgroup Evaluation of Alternative 3a: Direct Thermal Desorption (Direct Heating) of

13.5-7	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for the Chemical Sewers Subgroup
14.0-1	Characteristics of the Disposal Trenches Medium Group
14.1-1	Summary of the Disposal Trench Materials for the Complex Disposal Trenches Subgroup
14.1-2	Summary of Concentrations for the Complex Trenches Subgroup
14.1-3	Frequency of Detections for Complex Trenches Subgroup
14.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Complex Trenches Subgroup
14.2-2	Evaluation of Alternative 5b: Caps/Covers (Clay/Soil Cap); Vertical Barriers (Slurry Walls) with Consolidation for the Complex Trenches Subgroup
14.2-3	Evaluation of Alternative 14: Incineration/Pyrolysis (Rotary Kiln); Landfill (On-Post Landfill) for the Complex Trenches Subgroup
14.4-1	Summary of Concentrations for the Shell Trenches Subgroup
14.4-2	Frequency of Detections for Shell Trenches Subgroup
14.5-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Shell Trenches Subgroup
14.5-2	Evaluation of Alternative 5a: Caps/Covers (Clay/Soil Cap); Vertical Barriers (Slurry Walls) with Modifications to Existing System for the Shell Trenches Subgroup
14.5-3	Evaluation of Alternative 14: Incineration/Pyrolysis (Rotary Kiln); Landfill (On Post Landfill) for the Shell Trenches Subgroup
14.7-1	Summary of Concentrations for the Hex Pit Subgroup
14.7-2	Frequency of Detections for Hex Pit Subgroup
14.8-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Hex Pit Subgroup
14.8-2	Evaluation of Alternative 5: Caps/Covers (Clay/Soil Cap); Vertical Barriers (Slurry Walls) for the Hex Pit Subgroup
14.8-3	Evaluation of Alternative 14: Incineration/Pyrolysis (Rotary Kiln); Landfill (On Post Landfill) for the Hex Pit Subgroup
15.0-1	Characteristics of the Sanitary Landfills Medium Group
15.1-1	Summary of Concentrations for the Sanitary Landfills Medium Group
15.1-2	Frequency of Detections for Sanitary Landfills Medium Group
15.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Sanitary Landfills Medium Group
15.2-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the Sanitary Landfills Medium Group
15.2-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Sanitary Landfills Medium Group
15.2-4	Evaluation of Alternative 5: Caps/Covers (Clay/Soil Cap); Vertical Barriers (Slurry Walls); for the Sanitary Landfills Medium Group
15.2-5	Evaluation of Alternative 13b: Direct Thermal Desorption (Direct Heating); Landfill (On-Post Landfill) for the Sanitary Landfills Medium Group
16.0-1	Characteristics of the Lime Basins Medium Group
16.1-1	Summary of Concentrations for the Section 36 Lime Basins Subgroup
16.1-2	Frequency of Detections for Section 36 Lime Basins
16.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the Section 36 Lime Basins Subgroup
16.2-2	Evaluation of Alternative 6d: Caps/Covers (Clay/Soil Cap) with Modifications to Existing System for the Section 36 Lime Basins Subgroup
16.2-3	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for

16.2-4	Evaluation of Alternative 19a: In Situ Thermal Treatment (RF/Microwave
	Heating) for the Section 36 Lime Basins Subgroup
16.4-1	Summary of Concentrations for the Buried M-1 Pits Subgroup
16.4-2	Frequency of Detections for Buried M-1 Pits Subgroup
16.5-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
	Buried M-1 Pits Subgroup
16.5-2	Evaluation of Alternative 5: Caps/Covers (Clay/Soil Cap); Vertical Barriers
	(Slurry Wall) for the Buried M-1 Pits Subgroup
16.5-3	Evaluation of Alternative 10: Direct Solidification/Stabilization (Cement-Based
	Solidification) for the Buried M-1 Pits Subgroup
16.5-4	Evaluation of Alternative 19: In Situ Thermal Treatment (RF/Microwave
	Heating); In Situ Solidification/Stabilization (Cement-Based Solidification) for
	the Buried M-1 Pits Subgroup
16.5-5	Evaluation of Alternative 21: In Situ Thermal Treatment (In Situ Vitrification)
•	for the Buried M-1 Pits Subgroup
17.0-1	Characteristics of the South Plants Medium Group
17.1-1	Summary of Concentrations for the South Plants Central Processing Area
	Subgroup
17.1-2	Frequency of Detections for South Plants Central Processing Subgroup
17.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
	South Plants Central Processing Area Subgroup
17.2-2	Evaluation of Alternative 1b: Direct Thermal Desorption (Direct Heating) and
	Direct Solidification/Stabilization (Cement-Based Solidification) of Principal
	Threat Volume; No Additional Action (Provisions of FFA) for the South Plants
	Central Processing Area Subgroup
17.2-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the South Plants
	Central Processing Area Subgroup
17.2-4	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the South Plants
	Central Processing Area Subgroup
17.2-5	Evaluation of Alternative 6a: Direct Thermal Desorption (Direct Heating) and
	Direct Solidification/Stabilization (Cement-Based Solidification) of Principal
	Threat Volume; Caps/Covers (Clay/Soil Cap) for the South Plants Central
	Processing Area Subgroup
17.2-6	Evaluation of Alternative 13: Direct Thermal Desorption (Direct Heating);
	Direct Solidification/Stabilization (Cement-Based Solidification) for the South
	Plants Central Processing Area Subgroup
17.2-7	Evaluation of Alternative 19: In Situ Thermal Treatment (RF/Microwave
	Heating); In Situ Solidification/Stabilization (Cement-Based Solidification) for
	the South Plants Central Processing Area Subgroup
17.4-1	Summary of Concentrations for the South Plants Ditches Subgroup
17.4-2	Frequency of Detections for South Plants Ditches Subgroup
17.5-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
	South Plants Ditches Subgroup
17.5-2	Evaluation of Alternative 1a: Direct Thermal Desorption (Direct Heating) of
	Principal Threat Volume; No Additional Action (Provisions of FFA) for the
	South Plants Ditches Subgroup
17.5-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the South Plants
	Ditches Subgroup
17.5-4	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the South Plants
10 5 5	Ditches Subgroup
17.5-5	Evaluation of Alternative 6b: Direct Thermal Desorption (Direct Heating) of
	Principal Threat Volume; Caps/Covers (Clay/Soil Cap) with Consolidation for
	the South Plants Ditches Subgroup

17.5-6	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for the South Plants Ditches Subgroup
17.7-1	Summary of Concentrations for the South Plants Tank Farm Subgroup
17.7-2	Frequency of Detections for South Plants Tank Farm Subgroup
17.7-2	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
17.0-1	South Plants Tank Farm Subgroup
1707	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the South Plants
17.8-2	
1702	Tank Farm Subgroup  Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the South Plants
17.8-3	
	Tank Farm Subgroup
17.8-4	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
	the South Plants Tank Farm Subgroup
17.8-5	Evaluation of Alternative 16a: In Situ Physical/Chemical Treatment (Vacuum
	Extraction) for the South Plants Tank Farm Subgroup
17.8-6	Evaluation of Alternative 19a: In Situ Thermal Treatment (RF/Microwave
	Heating) for the South Plants Tank Farm Subgroup
17.10-1	Summary of Concentrations for the South Plants Balance of Areas Subgroup
17.10-2	Frequency of Detections for South Plants Balance of Areas Subgroup
17.11-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
	South Plants Balance of Areas Subgroup
17.11-2	Evaluation of Alternative 1a: Direct Thermal Desorption (Direct Heating) of
	Principal Threat Volume; No Additional Action (Provisions of FFA) for the
	South Plants Balance of Areas Subgroup
17.11-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the South Plants
	Balance of Areas Subgroup
17.11-4	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the South Plants
	Balance of Areas Subgroup
17.11-5	Evaluation of Alternative 6b: Direct Thermal Desorption (Direct Heating) of
	Principal Threat Volume; Caps/Covers (Clay/Soil Cap) with Consolidation for
	the South Plants Balance of Areas Subgroup
17.11-6	Evaluation of Alternative 13: Direct Thermal Desorption (Direct Heating);
	Direct Solidification/Stabilization (Cement-Based Solidification) for the South
	Plants Balance of Areas Subgroup
17.11-7	Evaluation of Alternative 19: In Situ Thermal Treatment (RF/Microwave
	Heating); In Situ Solidification/Stabilization (Cement-Based Solidification) for
	the South Plants Balance of Areas Subgroup
17.11-8	Evaluation of Alternative 20: In Situ Thermal Treatment (Surface Soil Heating);
	Direct Thermal Desorption (Direct Heating); Direct Solidification/Stabilization
	(Cement-Based Solidification) for the South Plants Balance of Areas Subgroup
18.0-1	Characteristics of the Buried Sediments Medium Group
18.1-1	Summary of Concentrations for the Buried Sediments Subgroup
18.1-2	Frequency of Detections for Buried Sediments Subgroup
18.2-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
	Buried Sediments Subgroup
18.2-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the
	Buried Sediments Subgroup
18.2-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Buried
	Sediments Subgroup
18.2-4	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the Buried
	Sediments Subgroup
18.2-5	Evaluation of Alternative 6g: Caps/Covers (Clay/Soil Cap) with Consolidation
	for the Buried Sediments Subgroup

18.2-6	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
	the Buried Sediments Subgroup
18.2-7	Evaluation of Alternative 19a: In Situ Thermal Treatment (RF/Microwave
	Heating) for the Buried Sediments Subgroup
18.4-1	Summary of Concentrations for the Sand Creek Lateral Subgroup
18.4-2	Frequency of Detections for Sand Creek Lateral Subgroup
18.5-1	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
	Sand Creek Lateral Subgroup
18.5-2	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Sand Creek
	Lateral Subgroup
18.5-3	Evaluation of Alternative 6g: Caps/Covers (Clay/Soil Cap) with Consolidation
10.0	for the Sand Creek Lateral Subgroup
18.5-4	Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
10.5	the Sand Creek Lateral Subgroup
19.0-1	Characteristics of the Undifferentiated Medium Group
19.1-1	Summary of Concentrations for the Section 36 Balance of Areas Subgroup
19.1-1	Frequency of Detections for Section 36 Balance of Areas Subgroup
19.1-2	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
19.2-1	Section 36 Balance of Areas Subgroup
19.2-2	Evaluation of Alternative 2: Access Restrictions (Modifications to FFA) for the
19.2-2	
10.2.2	Section 36 Balance of Areas Subgroup  Fundamental of Alternative 3. Londfill (On Best Londfill) for the Section 36
19.2-3	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Section 36
10.2.4	Balance of Areas Subgroup
19.2-4	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the Section 36
10.2.5	Balance of Areas Subgroup
19.2-5	Evaluation of Alternative 6g: Caps/Covers (Clay/Soil Cap) with Consolidation
19.2-6	for the Section 36 Balance of Areas Subgroup Evaluation of Alternative 13a: Direct Thermal Desorption (Direct Heating) for
19.2-0	the Section 36 Balance of Areas Subgroup
19.2-7	Evaluation of Alternative 19a: In Situ Thermal Treatment (RF/Microwave
19.2-1	Heating) for the Section 36 Balance of Areas Subgroup
19.4-1	Summary of Concentrations for the Burial Trenches Subgroup
19.4-1	Frequency of Detections for Burial Trenches Subgroup
19.4-2	Evaluation of Alternative 1: No Additional Action (Provisions of FFA) for the
17.5-1	Burial Trenches Subgroup
19.5-2	Evaluation of Alternative 3: Landfill (On-Post Landfill) for the Burial Trenches
19.5-2	Subgroup
19.5-3	Evaluation of Alternative 6: Caps/Covers (Clay/Soil Cap) for the Burial
19.5-3	
10.5.4	Trenches Subgroup  Evaluation of Alternative 10: Direct Solidification/Stabilization (Cement-Based
19.5-4	
20.1-1	Solidification) for the Burial Trenches Subgroup
	Summary of Preferred Alternative for Munitions Testing Medium Group
20.1-2	Summary of Preferred Alternative for Agent Testing Medium Group
20.1-3	Summary of Preferred Alternative for Lake Sediments Medium Group
20.1-4	Summary of Preferred Alternative for Surficial Soils Medium Group
20.1-5	Summary of Preferred Alternative for Ditches/Drainage Areas Medium Group
20.1-6	Summary of Preferred Alternative for Basin A Medium Group
20.1-7	Summary of Preferred Alternative for Basin F Wastepile Medium Group
20.1-8	Summary of Preferred Alternative for Secondary Basins Medium Group
20.1-9	Summary of Preferred Alternative for Sewer Systems Medium Group
20.1-10	Summary of Preferred Alternative for Disposal Trenches Medium Group
20.1-11	Summary of Preferred Alternative for Sanitary Landfills Medium Group
20.1-12	Summary of Preferred Alternative for Lime Basins Medium Group

20.1-13	Summary of Preferred Alternative for South Plants Medium Group			
20.1-14	Summary of Preferred Alternative for Buried Sediments/Ditches Medium Group			
20.1-15	Summary of Preferred Alternative for Undifferentiated Medium Group			
20.1-16	Summary of Preferred Alternatives			
VOLUME V	of VII - WATER DAA			
1.2-1	Summary of Groundwater-Related Interim Response Actions			
1.3-1	Plume Evaluation Criteria for Groundwater			
1.3-2	Design Treatment Goals for Groundwater			
1.3-3	Target Effluent Concentrations for Groundwater			
2.2-1	reliminary Remediation Goals (PRGs) for Groundwater at the Boundary of			
	Rocky Mountain Arsenal			
3.1-1	Water Medium Plume Groups			
3.1-2	ist of Target Organic Analytes			
3.2-1	Wells Used to Calculate TSGM Values			
4.0-1	Comparative Analysis of Alternatives: Northwest Boundary Plume Group			
5.0-1	Comparative Analysis of Alternatives: Western Plume Group			
6.0-1	Comparative Analysis of Alternatives: North Boundary Plume Group			
6.3-1	North Boundary Plume Group Estimated Influent Concentrations			
6.4-1	NC-3 Basins C & F Intercept System Estimated Influent Concentrations			
7.0-1	Comparative Analysis of Alternatives: Basin A Plume Group			
7.3-1	AC-3 Basin A Plume Group Estimated Influent Concentrations			
8.0-1	Comparative Analysis of Alternatives: South Plants Plume Group			
8.2-1	SPC-3 South Plants North Source, South Plants Southeast, and South Tank Farm			
	Plumes Estimated Influent Concentrations			
8.4-1	SPC-3 South Plants North Source and Southeast Plumes Estimated Influent			
	Concentrations			
8.4-2	SPC-3 South Tank Farm Direct Biological Treatment Estimated Influent			
	Concentrations			
8.6-1	SPC-5 South Tank Farm Plume In Situ Biological Treatment Estimated Influent			
	Concentrations			
8.6-2	AC-3/SPC-5 Combined South Plants North Source, South Plants Southeast			
	Plumes, and Basin A Plume Group Estimated Influent Concentrations			
8.7-1	SPC-6 South Plants Dewatering Estimated Influent Concentrations			
8.9-1	SPC-7 South Plants Dewatering with Cap Estimated Influent Concentrations			
9.0-1	Summary of Preferred Alternatives			
9.1-1	Selection of Preferred Alternatives - Northwest Boundary Plume Group			
9.2-1	Selection of Preferred Alternatives - Western Plume Group			
9.3-1	Selection of Preferred Alternatives - North Boundary Plume Group			
9.4-1 Selection of Preferred Alternatives - Basin A Plume Group				
9.5-1	Selection of Preferred Alternatives - South Plants Plume Group			
	of VII - STRUCTURES DAA			
1.2–1	No Future Use, Manufacturing History Medium Group Alternatives			
1.2–2	No Future Use, Agent History Medium Group Alternatives			
3.5–1	Material Volumes For No Future Use, Manufacturing History Medium			
	Group-Non-Process History Subgroup			
3.5–2	Material Volumes For No Future Use, Manufacturing History Medium			
	Group-Process History Subgroup			
3.5–3	Material Volumes for No Future Use, Agent History Medium Group			
6.0–1	Comparative Analysis of Alternatives, No Future Use, Manufacturing History			
	Medium Group-Process History Subgroup			

7.0–1	Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup
8.0-1	Comparative Analysis of Alternatives, No Future Use, Agent History Medium Group
9.4-1	Summary of Preferred Alternatives, No Future Use, Manufacturing History Medium Group-Process History Subgroup
9.4-2	Summary of Preferred Alternatives, No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup
0.4.2	Summary of Preferred Alternatives, No Future Use, Agent History Medium
9.4-3	Group
9.4-4	Cost Summary for Structures Remediation
VOLUME VI	I of VII - TECHNOLOGY DESCRIPTIONS
3.1-1	Summary of Institutional Controls
3.2-1	Costs for Institutional Controls
4.1-1	Applicability of Excavation Equipment to the RMA Soil Medium
	Groups/Subgroups
4.1-2	Excavation Costs
4.2-1	Demolition Costs
4.3-1	Transportation Costs
5.1-1	Performance for Extraction
5.1-2	Performance of Reinjection Method
6.1-1	Determination of Capital and Operating Costs for Clay/Soil Cover
6.2-1	Determination of Capital and Operating Costs for Clay/Soil Cap
6.3-1	Determination of Capital and Operating Costs for Slurry Wall
6.4-1	Determination of Capital and Operating Costs for Composite Cap
6.5-1	Determination of Capital and Operating Costs for Hazardous Waste Landfill
	Determination of Capital and Operating Costs for Solid Waste Landfill
6.5-2	Capital and Operating Costs for Direct Thermal Desorption
7.1-1	Performance Information on Thermal Desorption of Pesticide-
7.1-2	Contaminated Soils
7.2-1	Capital and Operating Costs for Direct Incineration/Pyrolysis
7.2-2	Performance Information on the Incineration of Pesticide-
1.2-2	Contaminated Soils
7.3-1	Capital and Operating Costs for Off-Post Incineration
<i>1.5</i> -1	of Structural Debris
8.1-1	Capital and Operating Costs for Enhanced Surface Soil Vapor
0.1-1	Extraction Process
8.1-2	ESSVEP Pilot Test Soil Sampling Results
8.2-1	Capital and Operating Costs for RF Heating
8.3-1	Capital and Operating Costs for In Situ Vitrification
8.4-1	Capital and Operating Costs for Hot Gas Decontamination
9.1-1	Capital and Operating Costs for Agent-Filled UXO Incineration/Pyrolysis, On-
	Post
9.1-2	Capital and Operating Costs for HE-Filled UXO Demilitarization, On Post
9.2-1	Capital and Operating Costs for Agent-Filled UXO Incineration/Pyrolysis, Off Post
9.2-2	Capital and Operating Costs for HE-filled UXO Demilitarization, Off Post
9.3-1	Capital and Operating Costs for Agent Solution Washing
9.4-1	Capital and Operating Costs for Agent Caustic Washing/Solvent Extraction
9.5-1	Capital and Operating Costs for the Incineration of Agent-Contaminated Soils
10.1-1	Capital and Operating Costs for Direct Cement-Based Solidification
10.2-1	Capital and Operating Costs for Direct Proprietary Agent Solidification

10.3-1	Capital and Operating Costs for In Situ Cement-Based Solidification	
10.4-1	Capital and Operating Costs for In Situ Proprietary Solidification	
12.1-1	Capital and Operating Costs for Soil Washing	
12.1-2	Summary of Soil Washing Results from Other Sites	
12.2-1	Capital and Operating Costs for Soil Flushing	
12.2-2	Physical Properties Pertaining to Soil Flushing for COCs at RMA	
12.2-3	Summary of Soil Flushing Results from Other Sites	
12.3-1	Capital and Operating Costs for Soil Vapor Extraction	
12.3-2	Physical Properties Pertaining to Vapor Extraction	
12.3-3	Summary of Soil Vapor Extraction Results from Other Sites	
12.4-1	Capital and Operating Costs for Solvent Washing	
13.1-1	Capital and Operating Costs for Pipe Plugging	
13.2-1	Capital and Operating Costs for Vacuum Dusting	
13.3-1	Capital and Operating Costs for Sand Blasting	
13.4-1	Capital and Operating Costs for Steam Cleaning	
14.1-1	Past Chemical Oxidation Research Efforts Using RMA Waters	
14.2-1	GAC Treatment Systems Using RMA Waters	
14.3-1	Vapor-Phase Post-Treatment Technologies for Air Stripping	
14.3-2	Summary of Air Stripping Costs	
14.3-3	Henry's Law Constants for Contaminants of Concern at RMA	
15.1-1	List of Technologies with Air Sidestreams	
15.2-1		
	Stripping and Oxidation Units	
15.2-2	Vapor-Phase Carbon Cost Summary	
15.2-3	Vapor-Phase GAC with Carbon Regeneration Unit	
15.2-4	Catalytic Oxidation Cost Summary	
15.2-5	Catalytic Oxidation Versus Vapor Phase GAC - Table Cost Summary	

### LIST OF FIGURES

	VI - EXECUTIVE SUMMARY
ES5.4-1	Summary of Preferred Soils Alternatives
ES5.4-2	Preferred Principal Threat Alternatives
ES5.4-3	Containment Alternatives
ES6.2-1	Total Organic Plumes for Unconfined Flow System
ES6.4-1	Preferred Water Alternatives
	F VII - SOILS DAA (Sections 1 through 13)
3.1-1	Human Health and Biota Exceedance Areas
3.1-2	Potential Agent and UXO Presence Areas
3.2-1	Alternatives Screening Summary for Munitions Testing Medium Group, Potential UXO Presence Exceedance Category
3.2-2	Alternatives Screening Summary for Agent Storage Medium Group, Potential Agent Presence
3.2 2	Category
3.2-3	Alternatives Screening Summary for the Lake Sediments Medium Group, Biota Exceedance Category
3.2-4	Alternatives Screening Summary for the Surficial Soils Medium Group, Biota Exceedance Category
3.2-5	Alternatives Screening Summary for the Ditches/Drainages Areas Medium Group, Biota Exceedance
5.2 5	Category
3.2-6	Alternative Screening Summary for the Basin A Medium Group, Human Health Exceedance Category
3.2-7	Alternatives Screening Summary for the Basin F Wastepile Medium Group, Human Health
	Exceedance Category
3.2-8	Alternatives Screening Summary for the Secondary Basins Medium Group, Human Health
	Exceedance Category
3.2-9	Alternatives Screening Summary for the Sewer Systems Medium Group, Human Health Exceedance Category
3.2-10	Alternatives Screening Summary for the Disposal Trenches Medium Group, Human Health
0.2 10	Exceedance Category
3.2-11	Alternatives Screening Summary for Sanitary Landfills Medium Group, Human Health Exceedance
	Category
3.2-12	Alternatives Screening Summary for Lime Basins Medium Group, Human Health Exceedance
	Category
3.2-13	Alternatives Screening Summary for South Plants Medium Group, Human Health Exceedance
	Category
3.2-14	Alternatives Screening Summary for Buried Sediments/Ditches Medium Group, Human Health
	Exceedance Category
3.2-15	Alternatives Screening Summary for Undifferentiated Medium Group, Human Health Exceedance
	Category
4.4-1	Alternative A3: Direct Soil Washing (Solution Washing); Landfill
4.4-2	Alternative A4: Incineration/Pyrolysis
4.4-3	Alternative A5: Direct Soil Washing (Solvent Washing); Landfill
4.5-1	Alternative B6: Direct Thermal Desorption
4.6-1	Alternative 8: Direct Soil Washing; Direct Thermal Desorption
4.6-2	Alternative 8a: Direct Soil Washing
4.6-3	Alternative 9a: Direct Soil Washing; Direct Thermal Desorption
4.6-4	Alternative 10: Direct Solidification/Stabilization
4.6-5	Alternative 13: Direct Thermal Desorption; Direct Solidification/Stabilization
4.6-6	Alternative 13a: Direct Thermal Desorption
4.6-7	Alternative 14: Incineration/Pyrolysis; Landfill
5.0-1	Site Locations, Munitions Testing Medium Group
6.0-1	Site Locations, North Plants Subgroup
6.0-2	Site Locations, Toxic Storage Yards Subgroup

6.1-1	Exceedance Areas, North Plants Subgroup
6.4-1	Exceedance Areas, Toxic Storage Yards Subgroup
7.0-1	Site Locations, Lake Sediments Medium Group
7.1-1	Exceedance Areas Lake Sediments Medium Group
8.0-1	Site Locations, Surficial Soils Medium Group
8.1-1	Exceedance Areas, Surficial Soils Medium Group
9.0-1	Site Locations, Ditches/Drainage Areas Medium Group
9.1-1	Exceedance Areas, Ditches/Drainage Areas Medium Group
10.0-1	Site Locations, Basin A Medium Group
10.1-1	Exceedance Areas, Basin A Medium Group
10.1-2	Potential Agent/UXO Presence Areas, Basin A Medium Group
10.2-1	Schematic of Alternative 6F for Basin A Medium Group
11.0-1	Site Location, Basin F Wastepile Medium Group
12.0-1	Site Locations, Secondary Basins Medium Group
12.1-1	Exceedance Areas, Secondary Basins Subgroup
12.4-1	Exceedance Areas, Former Basin F Subgroup
12.7-1	Exceedance Areas, Basin F Exterior Subgroup
13.0-1	Site Locations, Sewer Systems Medium Group
13.1-1	Exceedance Areas, Sanitary/Process Water Sewers Subgroup
13.4-1	Exceedance Areas, Chemical Sewers Subgroup
13.4-2	Potential Agent Presence Area, Chemical Sewers Subgroup
13.1.2	1 Colonian 1 Bono 2 1 Colonia Caracteria Car
VOLUME II	I of VII - SOILS DAA (Sections 14 through 21)
14.0-1	Site Locations, Disposal Trenches Medium Group
14.1-1	Exceedance Areas, Complex Trenches Subgroup
14.1-2	Potential Agent/UXO Presence Areas, Complex Trenches Subgroup
15.0-1	Site Locations, Sanitary Landfills Medium Group
15.1-1	Exceedance Areas, Sanitary Landfills Medium Group
16.0-1	Site Locations, Lime Basins Medium Group
16.1-1	Exceedance Areas, Section 36 Lime Basins Subgroup
16.1-2	Potential Agent Presence Area, Section 36 Lime Basins Subgroup
16.4-1	Exceedance Areas, Buried M-1 Pits Subgroup
16.4-2	Potential Agent Presence Area, Buried M-1 Pits Subgroup
17.0-1	Site Locations, South Plants Medium Group
17.1-1	Exceedance Areas, South Plants Central Processing Area Subgroup
17.1-2	Potential Agent Presence Area, South Plants Central Processing Area Subgroup
17.2-1	Clay/Soil Cap for South Plants
17.2-2	Schematic of Alternative 6a for South Plants Central Processing Subgroup
17.4-1	Exceedance Areas, South Plants Ditches Subgroup
17.7-1	Exceedance Areas, South Plants Tank Farm Subgroup
17.10-1	Exceedance Areas, South Plants Balance of Areas Subgroup
17.10-2	Potential Agent/UXO Presence Areas, South Plants Balance of Areas Subgroup
18.0-1	Site Locations, Buried Sediments Subgroup
18.0-2	Site Locations, Sand Creek Lateral Subgroup
18.1-1	Exceedance Areas, Buried Sediments Subgroup
18.4-1	Exceedance Areas, Sand Creek Lateral Subgroup
19.0-1	Site Locations, Undifferentiated Medium Group
19.1-1	Exceedance Areas, Section 36 Balance of Areas Subgroup
19.1-2	Potential Agent/UXO Presence Areas, Section 36 Balance of Areas Subgroup
19.4-1	Exceedance Areas, Burial Trenches Subgroup
19.4-2	Potential Agent/UXO Presence Areas, Burial Trenches Subgroup
20.1-1	Summary of Preferred Soils Alternatives
20.1-2	Summery of Preferred Alternatives for Principal Threat Volume
_	•

20.1-3	Long-term On-Post Army Soils Management Areas
20.2-1	Summary of Preferred Alternatives for Human Health Exceedance Areas
20.3-1	Summary of Preferred Alternatives for Biota Exceedance Areas
20.4-1	Summary of Preferred Alternatives for Areas with Potential Agent Presence
20.5-1	Summary of Preferred Alternatives for Areas with Potential UXO Presence
VOLUME V	of VII - WATER DAA
1.2-1	Northwest Boundary Plume Group Alternatives Retained in DSA
1.2-2	Western Plume Group Alternatives Retained in DSA
1.2-3	North Boundary Plume Group Alternatives Retained in DSA
1.2-4	Basin A Plume Group Alternatives Retained in DSA
1.2-5	South Plants Plume Group Alternatives Retained in DSA
3.1-1	Total Organic Plumes for Unconfined Flow System
4.1-1	Schematic for Northwest Boundary Plume Group Control Alternative NWC-1
4.2-1	Schematic for Northwest Boundary Plume Group Control Alternative NWC-2
5.1-1	Schematic for Western Plume Group Control Alternative WC-1
5.2-1	Schematic for Western Plume Group Control Alternative WC-2
6.1-1	Schematic for North Boundary Plume Group Control Alternative NC-1
6.2-1	Schematic for North Boundary Plume Group Control Alternative NC-2
6.3-1	Schematic for North Boundary Plume Group Control Alternative NC-3/NT-2
6.4-1	Schematic for North Boundary Plume Group Control Alternative NC-3/NT-3, NT-4
6.5-1	Process Flow Diagram Treatment Alternative NT-4, Oxidation
6.6-1	Schematic for North Boundary Plume Group Control Alternative NC-6
7.1-1	Schematic for Basin A Plume Group Control Alternative AC-1
7.2-1	Schematic for Basin A Plume Group Control Alternative AC-2
7.3-1	Schematic for Basin A Plume Group Control Alternative AC-3
7.3-2	Process Flow Diagram, Treatment Alternative AT-2, Air Stripping/GAC Adsorption
7.4-1	Process Flow Diagram, Treatment Alternative AT-4, Air Stripping/Oxidation/GAC Adsorption
7.5-1	Schematic for Basin A Plume Group Control Alternative AC-7
8.1-1	Schematic for South Plants Plume Group Control Alternative SPC-1
8.2-1	Schematic for South Plants Plume Group Control Alternative SPC-3
8.2-2	Process Flow Diagram, Treatment Alternative SPT-2, Air Stripping/GAC Adsorption
8.3-1	Process Flow Diagram, Treatment Alternative SPT-3, Ozone/H <sub>2</sub> O <sub>2</sub> Oxidation/GAC Adsorption
8.4-1	Process Flow Diagram, Treatment Alternative SPT-4, Direct Biological Treatment/GAC Adsorption
8.5-1	Process Flow Diagram, Treatment Alternative SPT-3 (With SPT-4) UV/H <sub>2</sub> O <sub>2</sub> Oxidation/GAC
0.6.1	Adsorption Schematic for South Plants Plume Group Control Alternative SPC-5
8.6-1	Process Flow Diagram, Treatment Alternative SPT-5, In Situ Biodegradation
8.6-2	Schematic for South Plants Plume Group Control Alternative SPC-6 Phase I (Years 1-10)
8.7-1	Schematic for South Plants Plume Group Control Alternative SPC-6, Phase II (Years 11-30)
8.7-2	Process Flow Diagram, Treatment Alternative SPT-3 (SPC-6 or SPC-7) Ozone/H <sub>2</sub> O <sub>2</sub> Oxidation/GAC
8.8-1	Adsorption
8.9-1	Schematic for South Plants Plume Group Control Alternative SPC-7 Phase I (Years 1-10)
8.9-2	Schematic for South Plants Plume Group Control Alternative SPC-7 Phase II (Years 11-30)
10.0-1	Schematic for Combined Basin A/South Plants Plume Groups Control Alternatives AC-3/SPC-7
	Phase I (Years 1-10)
10.0-2	Schematic for Combined Basin A/South Plants Plume Groups Control Alternatives AC-3/SPC-7 Phase II (Years 11-30)

### **VOLUME VI OF VII - STRUCTURES DAA**

1.2-1	Summary of Alternative Screening Future Use, No Potential Exposure Problems
1.2-2	Summary of Alternative Screening No Future Use, Nonmanufacturing History
1.2-3	Summary of Alternative Screening No Future Use, Manufacturing History
1.2-4	Summary of Alternative Screening No Future Use. Agent History

### VOLUME VII of VII - TECHNOLOGY DESCRIPTIONS

VOLUME VII of VII - TECHNOLOGY DESCRIPTIONS			
5.1-1	Extraction Well		
5.1-2	Typical Recharge Trench		
6.2-1	Clay/Soil Cap Detail		
6.3-1	Clay/Soil Cap and Slurry Wall Edge Configuration Detail		
6.4-1	Composite Cap Detail		
6.5-1	Location of Primary Site for Hazardous Waste Landfill		
6.5-2	Typical Cross Section of RCRA Landfill Cell		
6.5-3	Schematic of Typical RCRA Landfill Cover		
6.5-4	Schematic of Typical RCRA Landfill Liner		
6.5-5	Detail of Solid Waste Landfill Liner		
6.5-6	Schematic of Typical Solid Waste Landfill Cover		
6.5-7	Facility Layout for Hazardous and Nonhazardous Landfill Cells		
7.1-1	Block Flow Diagram for Thermal Desorption		
7.2-1	Rotary Kiln Incineration		
8.1-1	Schematic of Enhanced Surface Soil Vapor Extraction Process		
8.1-2	ESSVEP Soil Heating Assembly Configuration Diagram		
8.3-1	In Situ Vitrification System		
8.4-1	Hot Gas Decontamination System		
10.1-1	Direct Solidification		
10.3-1	In Situ Solidification		
11.1-1	Caterpillar SS-250 Soil Stabilizer		
11.2-1	Fluidized Carbon Bed Biological Treatment		
11.3-1	In Situ Biodegradation		
12.1-1	Schematic of the Soil Washing Process		
12.2-1	In Situ Soil Flushing		
12.3-1	Generic Soil Vapor Extraction System		
12.4-1	Schematic of the TEA-Based Solvent Extraction Process		

### LIST OF PLATES

<u>VOLUME VI of VII – STRUCTURES DAA</u> Plate 1.1-1 Structures Medium Groups

No Future Use, Agent History Medium Group Plate 3.0-1

### LIST OF ACRONYMS AND ABBREVIATIONS

μg/l micrograms per liter3-D three-dimensional

ACGIH American Conference of Governmental Industrial Hygienists

ACM asbestos-containing material
AMC Army Materiel Command
AOC Area of Contamination
AOPs advanced oxidation processes

AR Army Regulations

ARARs applicable or relevant and appropriate requirements

Army U.S. Army

atm-m<sup>3</sup>/mol atmospheres per cubic meters per mole

ATP Anaerobic Thermal Processor

ATSDR Agency for Toxic Substances and Disease Registry

BCY bank cubic yard

BDAT best demonstrated available technology
BEST Basic Extraction Sludge Treatment

BFI Browning Ferris Industries
BOD Biological Oxygen Demand

BTEX benzene, toluene, ethylbenzene, and xylenes

BTU British thermal unit

CAMU Corrective Action Management Unit CAR Contamination Assessment Report

CCA chromated-copper-arsenate
CCR Code of Colorado Regulations

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

cfm cubic feet per minute
CFR Code of Federal Regulations

CLC2A Chloroacetic Acid
cm/sec centimeters per second
cm² centimeters squared
COC contaminant of concern
CPE chlorinated polyethylene

CPRP Chemical Personnel Reliability Program

CRL certified reporting limit
CSI Conservation Services, Inc.
CSPE chlorosulfonated polyethylene

CWA Clean Water Act
CY cubic yards

DA Department of the Army

DAA Detailed Analysis of Alternatives
DADS Denver Arapahoe Disposal Service, Inc.

db(A) decibels

DBCP dibromochloropropane
DCPD dicyclopentadiene
DDE dichlorodiphenylethane

DDT dichlorodiphenyltrichloroethane

DHHS Department of Health and Human Services

DIMP diisopropylmethyl phosphorate
DNAPL dense nonaqueous phase liquid

DOD Department of Defense

DOT Department of Transportation
DRE destruction removal efficiency

DRMO Defense Reutilization and Marketing Office
DSA Development and Screening of Alternatives

EA Endangerment Assessment

Ecology U.S. Ecology, Inc.

EDSVEP Enhanced Deep Soil Vapor Extraction Process

ENSCO Environmental Systems Company
Envirosafe Envirosafe Services of Idaho, Inc.
EOD Explosive Ordnance Disposal

EPA U.S. Environmental Protection Agency ERC Ecological Risk Characterization

ESSVEP Enhanced Surface Soil Vapor Extraction Process

ETTS Ecotechniek Thermal Treatment System

FC2A fluoroacetic acid

FFA Federal Facility Agreement FML flexible membrane liner

fpm feet per minute

FRP fiber - reinforced plastic

FS feasibility study ft/day feet per day ft feet or foot cubic feet

GAA granulated activated alumina GAC granular activated carbon

GB isopropylmethylphosphonosfluoridate (nerve agent-sarin)

gpm gallons per minute
H:V horizontal to vertical
H<sub>2</sub>O<sub>2</sub> hydrogen peroxide
HBr hydrogen bromide

HCCPD hexachlorocyclopentadiene

HCL hydrochloric acid
HCPD Hexachloro pentadiene
HDPE high-density polyethylene

HE high explosive

HEP habitat evaluation protocol HEPA high efficiency particulate

HF hydrofluoric acid

Hg mercury

HHEA Human Health Exposure Assessment HHRC Human Health Risk Characterization

HI hazard index

ICP inductively coupled plasma
ICS Irondale Containment System

IDLH Immediately Dangerous to Life and Health IEA Integrated Endangerment Assessment

IITRI IIT Research Institute
IRA interim response action
IT International Technology

IWT International Waste Technologies

K<sub>oc</sub> partition coefficient

kw Kilowatt kWh Kilowatt hour L Lewisite

lbs/acre pounds per acre LCY loose cubic yards

LCY/hr loose cubic yards per hour LDR land disposal restriction

LF Linear Foot

LNAPL light nonaqueous phase liquid

LTTA Low-Temperature Thermal Treatment
LTTA Low-Temperature Thermal Aeration

mg/l micrograms per liter

mg/cm³ milligrams per cubic centimeter
mg/m³ milligram per cubic meter
mg/kg milligrams per kilogram
mg/l microgram per liter

MKE Morrison-Knudsen Engineering

ml/g milliliters per gram

mm millimeters

MMBTU million British thermal units

mph miles per hour

MTR minimum technology requirement

NaOH sodium hydroxide

NBCS North Boundary Containment System

NCP National Contingency Plan
NEPA National Environmental Policy Act
NWBCS Northwest Boundary Containment System

O&M operations and maintenance
OAS Organizations and State
°C degrees Centigrade
OCP organochlorine pesticides

OCPD dicyclopentadiene
°F degrees Fahrenheit

OPHGB organophosphorus compounds, GB-agent related OPHP organophosphorus Compounds; pesticide related OSCH organosulfur compounds; herbicide related OSCM organosulfur Compounds; mustard agent related OSHA Occupational Health and Safety Administration

PAHs polynuclear aromatic hydrocarbons

PBC probabalistic biota criteria
PCB polychlorinated biphenyls
pcf pounds per cubic foot
PCP pentachlorophenol
PEC plume evaluation criteria
PKPP potassium pyrophosphate

ppb parts per billion

PPE personal protective equipment PPLV preliminary pollutant limit value

ppm parts per million

PRG preliminary remediation goal psi pounds per square inch PVC polyvinyl chloride

QA/QC quality assurance/quality control RAO remedial action objectives

Resource Conservation and Recovery Act **RCRA** 

RF radio frequency

RI Remedial Investigation

RISR Remedial Investigation Summary Report

Rocky Mountain Arsenal **RMA** Record of Decision ROD

RPO representative process option

South Adams County Water and Sanitation District **SACWSA** 

SAR Study Area Report

Superfund Amendments and Reauthorization Act SARA

SCC Secondary Combustion Chamber

SEC Site evaluation criteria

square feet SF

Shell Oil Company Shell

Semivolatile halogenated organics SHO

Superfund Innovative Technology Evaluation SITE

Silicate Technology Corporation STC

soil vapor extraction SVE

semivolatile organic compounds **SVOCs** 

SY square yards Services HT-5 T.DI. **TBC** to be considered trichloroethylene TCE

Toxicity Characteristic Leaching Procedure TCLP

TEA triethylamine

Target Effluent Concentrations TEC TIS transportable incineration system toxicity, mobility, and volume TMV

TOC total organic carbon

tons per day tpd

Toxic Substances Control Act **TSCA** Treatment Storage and Disposal TSD **TSMG** two-step geometric mean

USCS Unified Soil Classification System U.S. Department of Agriculture USDA U.S. Fish and Wildlife Service USFWS USGS U.S. Geological Survey U.S. Pollution Control, Inc.

UV ultraviolet

USPCI

unexploded ordnance UXO

volatile aromatic organic compounds VAO volatile hydrocarbon compounds VHC VHO volatile halogenated organics VOC volatile organic compound

VX ethyl s-dimethyl aminoethyl methyl phosphonothiolate (nerve agent)

Waterways Experimental Station WES

### 1.0 INTRODUCTION

The objective of the Detailed Analysis of Alternatives (DAA) for structures is to analyze the remedial alternatives retained from the Development and Screening of Alternatives (DSA) and select a preferred alternative for each of the structures medium groups. The objectives of the DAA include the following:

- Outline any modifications made to the structures medium groups and remedial alternatives since the DSA was completed (Sections 1.1 and 1.2).
- Describe the methodology for detailed analysis and selection of preferred alternatives for each medium group (Section 2).
- Describe the interactions of the structures medium with the other media at Rocky Mountain Arsenal (RMA) (Section 2).
- Develop volume estimates for the structures medium groups (Section 3).
- Describe and analyze the retained alternatives for each of the structures medium groups (Sections 4 through 8).
- Perform a comparative analysis of the retained remedial alternatives including selecting a preferred remedial alternative for each of the structures medium groups, discussing risk management issues for each medium group, and summarizing the remediation scenario for the structures medium (Section 9).

### 1.1 STRUCTURES MEDIUM GROUPS

As described in the DSA, the structures medium is heterogeneous due to the wide variety of structural types and materials it encompasses, i.e., all aboveground structures, buildings, foundations and basements, tanks (including underground storage tanks), tank farms, process and non-process equipment (including "bone yards"), aboveground chemical pipelines, asbestoscontaining material (ACM), and other miscellaneous man-made objects placed at RMA since it was acquired by the U.S. Army (Army) in May 1942. The structures medium also includes artifacts, e.g. houses, barns, from earlier eras.

To facilitate the development and analysis of alternatives, four structures medium groups were developed during the DSA: Future Use, No Potential Exposure; No Future Use,

Nonmanufacturing History; No Future Use, Manufacturing History; and No Future Use, Agent History. As is evident from these names, structures with similar use histories were grouped together so that similar remedial options could be more efficiently applied and evaluated for each of the 983 structures at RMA. The No Future Use, Manufacturing History Medium Group was further defined during the DAA to include two subgroups, Process History and Non-Process History, which more accurately reflects their chemical use history. Section 3 defines and details the characteristics of all of the medium groups. Plate 1.1-1 shows the locations of the structures medium groups.

### 1.2 REMEDIAL ALTERNATIVES

During the DSA, remedial alternatives were developed and screened for each of the four structures medium groups. As part of the DAA process, the alternatives retained during the DSA for each medium group (Figures 1.2-1 through 1.2-4) were examined to determine whether any of the rejected alternatives should be re-evaluated or whether any of the retained alternatives should be modified. The rationale for changing the list of retained alternatives is based on several factors including changes in site conditions, changes in information regarding the structures, changes in information concerning technologies contained in the retained alternatives, changes in regulations, and changes in interactions with the other media of concern (i.e., soils and water). Changes were made to the retained alternatives list for the No Future Use, Manufacturing History and No Future Use, Agent History Medium Groups as described below.

Alphanumeric identifiers were used during the DSA to name the developed alternatives. The alphabetic codes were defined as follows:

- FN—Future Use, No Potential Exposure Problems
- NB—No Future Use, Nonmanufacturing History
- NA—No Future Use, Manufacturing History
- NH—No Future Use, Agent History

During the DAA, these alphabetic codes were dropped from use and the alternatives identified only by the number. In some cases, alternatives were added during the DAA. When this occurred, an "a" was attached to the number. For example, Alternative 9, which was developed for the No Future Use, Manufacturing History Medium Group originally included vacuum dusting or steam cleaning followed by salvage, dismantling, and landfilling. This alternative could not be effectively analyzed in detail because it contains two different in situ treatment technologies, vacuum dusting and steam cleaning. To simplify the detailed analysis, Alternative 9a was added and Alternative 9 modified such that Alternative 9 involves vacuum dusting, and Alternative 9a involves steam cleaning.

To analyze and select the most effective remedial alternatives for all of the media at RMA, the interactions between media were examined (Section 2.3). As a result, Alternative 21a was added to the list of retained alternatives and Alternative 21 modified. Alternative 21a includes salvaging, dismantling, and consolidating the resulting structural debris, creating an alternative that combines the consolidation of both soils and structural debris. The overall containment alternative for the soils South Plants Medium Group includes the capping of soils in the central processing area, so Alternative 21 was modified to place all of the structural debris from South Plants and outlying structures with soils in the cap to be located in the central processing area. In addition, to further minimize the amount of capped area, all the structural debris from North Plants and outlying structures is to be placed together in a single cap in North Plants and all structural debris from the Railyard and outlying structures is to be placed together in a single cap in the Railyard. In addition, since the structural debris is to be capped in centralized areas, the debris can be sized and compacted more efficiently, excluding the need for the geotextile base. Accordingly, the use of a geotextile base was removed from Alternative 21.

Alternatives 2a, 19a, and 20a were added for the Non-Process History Subgroup. Alternative 2 is a containment alternative that involves pipe plugging and access restrictions involving locks, boards, fences, and signs. The alternative is designed to immobilize residual contamination associated with process-related piping. Since structures in the Non-Process History Subgroup

contain no process piping, Alternative 2a was created. Alternative 2a involves containment (i.e., locks, boards, fences, and signs), but removes pipe plugging, which is not applicable to the Non-Process History Subgroup.

Alternatives 19 and 20 include disposing the structural debris in a hazardous waste landfill. These alternatives were designed to properly contain potentially hazardous debris. Since the structures in the Non-Process History Subgroup are not expected to be contaminated, disposal in a hazardous waste landfill is unnecessary. Alternatives 19a and 20a were therefore added to replace hazardous waste disposal with nonhazardous waste disposal for the structural debris.

As described earlier, the No Future Use, Manufacturing History Medium Group was divided into the Process History and the Non-Process History Subgroups during the DAA. The alternatives retained for this medium group were evaluated to determine the applicability of each alternative to the subgroups. Table 1.2-1 summarizes the range of alternatives that were analyzed during the DAA for subgroups in the No Future Use, Manufacturing History Medium Group.

For the No Future Use, Agent History Medium Group, one alternative that was rejected during the DSA was reconsidered in the DAA. Alternative 18 was rejected in the DSA due to implementation concerns associated with the peroxide/hypochlorite treatment of structural debris containing Army chemical agent. Further analysis of this treatment technology conducted for the soils medium indicated that many of the implementation concerns outlined in the DSA had been overcome in applications for soils and the demilitarization of agent-contaminated warheads. This prompted the re-evaluation of Alternative 18 in the DAA for the structures medium. Moreover, Alternative 18a, which adds in situ sand blasting to Alternative 18, was developed so that a treatment technology applicable to contaminants other than Army chemical agent could be evaluated. Table 1.2-2 lists the range of alternatives applicable to the No Future Use, Agent History Medium Group.

# Table 1.2-1 No-Future Use, Manufacturing History Medium Group Alternatives

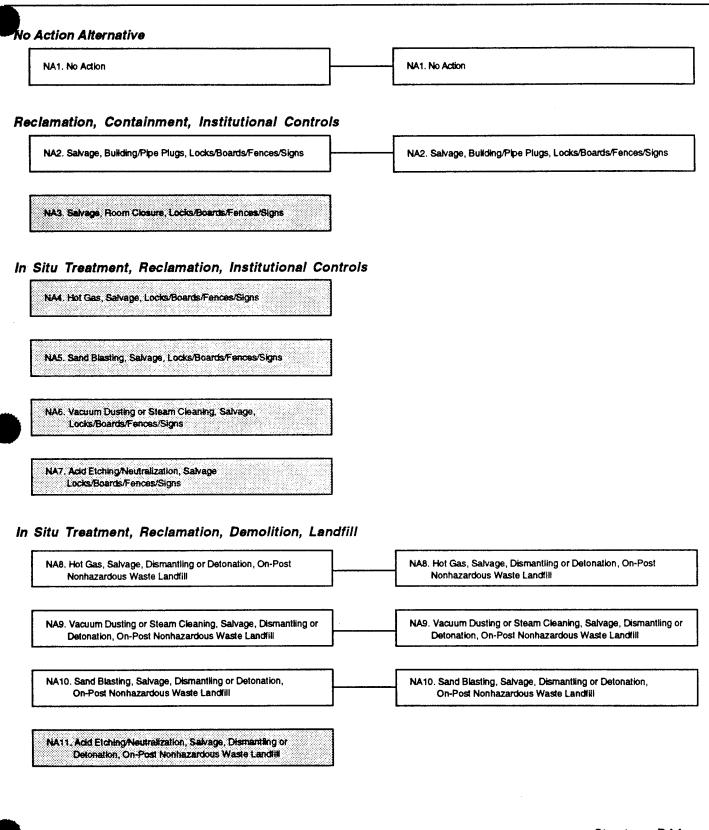
Subgroup	Alternatives for Detailed Analysis
Process History	<ol> <li>No Action (NA1)</li> <li>Pipe Plugs, Locks/ Boards/Fences/Signs (NA2)</li> <li>Pipe Plugs, Locks/ Boards/Fences/Signs (NA2)</li> <li>Hot Gas, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA9)</li> <li>Vacuum Dusting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA9)</li> <li>Sand Blasting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA10)</li> <li>Dismantling, Salvage, Off-Post Rotary Kiln Incineration, Off-Post Hazardous Waste Landfill (NA12)</li> <li>Dismantling, Salvage, On-Post Hazardous Waste Landfill (NA19)</li> <li>Dismantling, Salvage, Off-Post Hazardous Waste Landfill (NA20)</li> <li>Dismantling, Salvage, Clay Cap (NA21)</li> <li>Dismantling, Salvage, Clay Cap (NA21)</li> </ol>
Non-Process History	<ol> <li>No Action (NA1)</li> <li>Locks/Boards/Fences/Signs (NA2a)</li> <li>Locks/Boards/Fences/Signs (NA2a)</li> <li>Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA19a)</li> <li>Dismantling, Salvage, Clay Cap (NA21)</li> <li>Dismantling, Salvage, Clay Cap (NA21)</li> <li>Dismantling, Salvage, Consolidation (NA21a)</li> </ol>

## Table 1.2-2 No Future Use, Agent History Medium Group Alternatives

Medium Group	Alte	Alternatives for Detailed Analysis
No Future Use, Agent History	ä	No Action (NH1)
	4:	Hot Gas, Dismantling, On-Post Hazardous Waste Landfill (NH4)
	9:	Hot Gas, Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill (NH6)
	14:	Dismantling, On-Post Hazardous Waste Landfill (NH14)
	15:	Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill (NH15)
	17:	Dismantling, Hot Gas, On-Post Hazardous Waste Landfill (NH17)
	<u>-8</u>	
	18a:	: Sand Blasting, Dismantling, Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill (NH18a)

0	Action Alternative	_	
	FN1. No Action		FN1. No Action

No.	Action Alternative	
	NB1. No Action	NB1. No Action



## Peclamation, Demolition, Treatment of Debris and Waste, Landfill

NA12. Salvage, Dismantling or Detonation, Off-Post Rotary Klin Incineration, Off-Post Hazardous Waste Landfill NA12. Salvage, Dismantling or Detonation, Off-Post Rotary Klin Incineration, Off-Post Hazardous Waste Landfill

NA13. Salvage, Dismantling or Detonation, On-Post Rotary Klin Incineration, On-Post Nonhazardous Waste Landilli

NA13. Salvage, Dismantling or Detonation, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

NA14. Salvage, Dismantling or Detonation, Glassification, On-Post Nonhazardous Waste Landilli

NA15. Salvage, Dismantling or Detonation, Hot Gas, On-Post Nonhazardous Waste Landill

NA16. Salvage, Dismantling or Detonation, Vacuum Dusting or Steam Cleaning, On-Post Nonhazardous Waste Landfill

NA17. Salvage, Dismantling or Detonation, Acid Etching/Neutralization, On-Post Nonhazardous Waste Landfill

NA18. Salvage, Dismantling or Detonation, Thermoplastic Microencapsulation, On-Post Nonhazardous Waste Landfill

### Reclamation, Demolition, Landfill

NA19. Salvage, Dismantling or Detonation, On-Post Hazardous Waste Landfill NA19. Salvage, Dismantling or Detonation, On-Post Hazardous Waste Landfill

NA20. Salvage, Dismantling or Detonation, Off-Post Hazardous Waste Landfill NA20. Salvage, Dismantling or Detonation, Off-Post Hazardous Waste Landfill

### Reclamation, Demolition, Containment

NA21. Salvage, Dismantling or Detonation, Clay Cap with Geolextile Base NA21. Salvage, Dismantling or Detonation, Clay Cap with Geotextile Base

			_
Nο	Action	Alteri	native

NH1. No Action

NH1. No Action

### In Situ Treatment, Institutional Controls

NH2, Hot Gas, Locks/Boards/Fences/Signs

NH3. Peroxide/Hypochlorite, Locks/Boards/Fences/Signs

### In Situ Treatment, Demolition, Landfill

NH4. Hot Gas, Dismantling or Detonation, On-Post Hazardous Waste Landfill

NH5, Peroxide/Hypochlorite, Dismantling or Detonation, On-Post Hazardous Waste Landfill

### In Situ Treatment, Demolition, Treatment of Debris and Waste, Landfill

NH6. Hot Gas, Dismantling or Detonation, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

NH6. Hot Gas, Dismantling or Detonation, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

- NH7. Hot Gas, Dismantling or Detonation, Glassification, On-Post Hazardous Waste Landfill
- NH8. Hot Gas, Dismantling or Detonation, Hot Gas, On-Post Hazardous Waste Landtill
- NH9. Hot Gas, Dismantling or Detonation, Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill
- NH10 Peroxide/Hypochlorite, Dismantling or Detonation, On-Post Rotary Klin Incineration, On-Post Nonhazardous Waste Landilli
- NH11. Peroxide/Hypochlorite, Dismantling or Detonation, Glassification, On-Post Nonhazardous Waste Landfill
- NA12. Peroxide/Hypochlorite, Dismantling or Detonation, Hot Gas, On-Post Hazardous Weste Landilli
- NA13. Peroxide/Hypochiorite, Diamantling or Detonation, Peroxide/Hypochiorite, On-Post Hazardous Waste Landfill



## Demolition, Landfill

NH14. Dismantling or Detonation, On-Post Hazardous Waste Landfill

NH14. Dismantling or Detonation, On-Post Hazardous Waste Landfill

### Reclamation, Treatment of Debris and Waste, Landfill

NH15. Dismantling or Detonation, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

NH116. Dismantling or Detonation, Glassification, On-Post Nonhazerdous Waste Landfill

NH17. Dismantling or Detonation, Hot Gas, On-Post Hazardous Waste Landfill NH17. Dismantling or Detonation, Hot Gas, On-Post Hazardous Waste Landfill

NH18. Dismantling or Detonation, Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill

### 2.0 DAA METHODOLOGY FOR THE STRUCTURES MEDIUM

The DAA procedure for the structures medium is consistent with the U.S. Environmental Protection Agency (EPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (EPA-OERR 1988b). The Executive Summary describes the overall DAA procedure. The structures medium is complex, however, and contains unique concerns that must be addressed during the DAA. The following sections describe the DAA process as applied to the structures medium:

- Section 2.1 Volume and Area Estimates
- Section 2.2 Description and Analysis of Remedial Alternatives
- Section 2.3 Media Interactions
- Section 2.4 Structures Sampling

### 2.1 VOLUME AND AREA ESTIMATES

As a basis for estimating and comparing alternative costs in the DSA, a single RMA structure was identified to represent each medium group. The cost of each alternative was estimated for that structure and that cost was then used to represent costs for the entire medium group. Although this was an effective approach during the screening process, it did not provide an estimate of the total cost of implementing an alternative for all of the structures contained within a medium group.

To estimate remedial alternative costs in the DAA, total volume and area estimates for all of the structures in each medium group were calculated. To provide the information necessary to estimate costs, the following volumes and areas were estimated for each medium group:

- Collapsed standing volume of buildings
- Interior and exterior surface areas
- Volumes of construction material (e.g., brick, wood, metal)
- Volume of treatable surfaces

These estimates were calculated using the information provided in the Task 24 Final Structures Survey report (EBASCO 1988/RIC 88306R02), which was produced as part of the 1987 remedial investigation (RI) at RMA. Section 3 details the volume and area estimates for each of the structures medium groups and Appendix B contains the formulas used to estimate these quantities.

### 2.2 DESCRIPTION AND ANALYSIS OF REMEDIAL ALTERNATIVES

Sections 4 through 8 describe and analyze only those alternatives retained for the structures medium, while the Technology Description Volume details the mechanics of all of the individual process options. This reporting format allows the descriptions and analyses presented in Sections 4 through 8 to focus on the treatment train for an entire alternative.

The following sections explain the approach used to describe and analyze alternatives for the structures medium. In contrast to the soils and water media, most of the alternatives retained for the structures medium are very similar: in many cases there is only one process option that differentiates one alternative from another. Accordingly, the descriptions and analyses for most of the alternatives focus only on these differences.

### 2.2.1 Alternative Descriptions

Most of the alternatives developed for the structures medium are very similar. For example, for the No Future Use, Manufacturing History Medium Group, Alternatives 8, 9, 9a, 10, 12, 13, 19, 19a, 20, and 20a involve demolishing the structure and placing the debris in a landfill. Likewise for the No Future Use, Agent History Medium Group, Alternatives 4, 6, 14, 15, 17, and 18 involve these common elements: demolishing the structure and placing the debris in an on-post landfill. To avoid redundancy in describing the alternatives, Section 6 provides a description of the general alternative that includes demolition and landfilling. The subsequent descriptions of the individual alternatives focus on the differences of each specific alternative from the general alternative. Therefore, the description of Alternative 9—vacuum dusting followed by demolition

and landfilling—focuses on how vacuum dusting and the type of landfilling differentiate the alternative from the general description.

### 2.2.2 <u>Detailed Analysis of Alternatives</u>

As is the case with the descriptions of the alternatives, most of the analyses of the alternatives are very similar. Therefore, in addition to the description of the general alternatives (Section 2.2.1), a "general analysis" of the seven evaluation criteria is also provided. (For a discussion of the seven criteria—overall protection of human health and the environment; compliance with applicable, relevant, or appropriate requirements or (ARARs); long-term effectiveness and permanence; reduction of toxicity, mobility, or volume or (TMV); short-term effectiveness; implementability; and cost—see the Executive Summary.) For example, for the No Future Use, Manufacturing History Medium Group, Non-Process History Subgroup, an analysis of salvage, demolition, and landfilling is provided (Section 7) for all of the criteria except cost, which is unique for each alternative, and for the No Future Use, Agent History Medium Group, an analysis of demolition and landfilling is provided (Section 8) for all of the criteria except cost, which is unique for each alternative. The individual analysis of each alternative focuses on the differences from the general analysis. For example, the analysis of Alternative 9 focuses on how vacuum dusting and the specific type of landfilling affects the applicability and performance of the alternative.

### 2.2.3 Ongoing Actions Affecting Structures Remedial Alternatives

There are several ongoing activities that affect the structures remedial alternatives, the most significant of which are the following:

- Asbestos Interim Remedial Action (IRA)
- Polychlorinated Biphenyl (PCB) removal
- Chemical-process-related activities
- Underground storage tank removal
- Aboveground storage tank removal

The scope of the Asbestos IRA is to remove and dispose all ACM from RMA structures, piping and tanks. For the DAA, it was assumed that all costs associated with removing and disposing ACM are included as part of the Asbestos IRA. The Asbestos IRA may not be complete before the structures remediation begins, so any asbestos remaining in the structures will be removed as an integral part of the remediation process. In addition, since the scope of the PCB removal activity includes removal and disposal of all PCB-containing materials that are regulated under the Toxic Substances Control Act (TSCA), those costs are included under that program.

The current scope of the chemical-process-related activities includes removing all Army chemical agent and nonagent process equipment and piping from structures at RMA and stockpiling them on post. For the DAA, it was assumed that all process equipment and pipes are removed and cleaned prior to structures remediation. Since the scope of the chemical-process-related activities does not include disposal, the applicable costs for salvaging, transporting, and disposing process equipment and pipes is included as part of structures remediation.

The scopes of both the aboveground and underground storage tank removal actions are to remove all petroleum and hazardous substance tanks at RMA. The underground storage tanks are to be disposed as scrap metal, but the aboveground storage tanks are to be stockpiled on post. Therefore, the costs for salvaging, transporting, and disposing aboveground tanks are included as part of structures remediation.

Appendix C, Table 9.4-4 lists the estimated costs for these activities. The total estimated cost for these actions is \$130,000,000. These costs must be added to the costs developed during the DAA to obtain realistic remediation costs for the structures medium at RMA.

### 2.3 MEDIA INTERACTIONS

Remedial alternatives selected for each medium must be compatible so that they may be combined into a single remediation scenario that encompasses all of RMA. Accordingly, it is important to determine the interaction between the media and use this information both on a

medium-specific and RMA-wide basis. There are no alternatives developed for the water medium that directly impact the alternative selection for the structures medium, but there are several interactions between the structures and soil media that must be taken into consideration.

Several soils alternatives impact the structures alternative selection for both the No Future Use, Manufacturing History and No Future Use, Agent History Medium Groups. For example, the decision to cap sites within the Soils Agent Storage and South Plants Medium Groups and to excavate the Hex Pit disposal trench precludes the choice of no action or containment alternatives for structures in the No Future Use, Manufacturing History Medium Group: the structures must be removed to access underlying soils. Conversely, the decision to cap the two sites within the Soil Basin A Medium Group as well as areas in South Plants and North Plants allows the structures medium to evaluate consolidation of structural debris as a potential remedial alternative since the fill material necessary in these areas far exceeds the total volume of structural debris. In addition, the choice to cap sites contained within the Agent Storage and South Plants Soil Medium Groups removes the No Action alternative for structures in the No Future Use, Agent History Medium Group since the structures must be removed to access underlying soils. Plate 1.1-1 shows the interaction between the structures and soils media. When a structures alternative includes demolition, the foundations of the structure involved are to be removed if they interfere with soils alternatives. Foundations may not be removed if soils alternatives do not require it.

### 2.4 STRUCTURES SAMPLING

Sampling structures in an attempt to determine risk is inappropriate because there are no standard sampling procedures for standing structures and because there is a lack of standards or action levels for addressing structural contamination even when analytical results are available. The detection of an analyte in structural material does not necessarily imply that the analyte poses a risk to human health or the environment. The words "contaminant" and "contamination," when used with respect to structures, indicate only the presence or potential presence of analytes as detected in a specific sampling program; they do not necessarily imply any hazards to human

health or the environment. Structures sampling is to be performed only to support the structures remediation. The sampling techniques to be employed have not yet been determined, but may include guidance from the protocols derived from the expert panel on structure sampling. The type and extent of sampling that may be performed for the structures medium groups is as follows:

- Future Use, No Potential Exposure—Structures may be sampled as necessary in accordance with the Occupational Health and Safety Administration (OSHA).
- No Future Use, Manufacturing History—This medium group was divided into two subgroups, Process History and Non-Process History, as described in Section 1. It was assumed that 30 percent of the floor space of any structure in the Process History Subgroup was directly involved with a manufacturing process and therefore has the potential for contamination. The results of the pilot structures sampling program support the fact that only portions of those structures with a history of manufacturing activity have a potential for contamination. In addition, the demolition process, as described in this document, allows the segregation of potentially contaminated and potentially uncontaminated structural debris. Post-demolition sampling is to be applied to this subgroup as follows. For disposal in a nonhazardous waste landfill, a representative composite sample from all potentially nonhazardous waste is collected for every 100-cubic yard (CY) lot of debris. Any potentially hazardous waste is sampled in 20-CY lots (one truckload of debris) to determine whether the facility can accept the waste. For disposal in a hazardous waste landfill, all debris is sampled in 20-CY lots to characterize the waste stream for compliance with applicable landfill regulations.

For the Non-Process History Subgroup, it was assumed that all debris is potentially nonhazardous, an assumption that is supported by the results of the pilot structures sampling program. Post-demolition sampling of this debris is collected from each 100-CY lot to confirm whether it should be disposed in a hazardous or nonhazardous waste landfill.

The preferred alternative (Section 9.4) for both subgroups entails consolidating both soils and structural debris within the area of contamination (AOC). A debris sample will be taken every 1000 CY for confirmational analysis prior to consolidation. This sampling frequency is greater than that planned for soils, which samples every 2000 CY, but is justified because of the heterogenous nature of structure debris in comparison to soils. This same sampling rationale is also valid for capping the structural debris in place (Alternative 21).

For costing purposes, the analysis includes characterization according to the Resource Conservation and Recovery Act (RCRA), including full Toxicity Characteristic Leaching Procedure (TCLP) analysis expanded to include all RMA target analytes. The exact

- analyses, however, cannot be determined until a final list of ARARs has been approved. The appropriate analyses will be chosen to satisfy all applicable ARARs.
- No Future Use, Agent History—The preferred alterative (Section 9.4) entails placing debris in an on-post hazardous waste landfill. Post-demolition sampling of the structural debris is conducted to characterize the waste stream. Once the structural debris has met the requirements of Army Regulations (AR) 385-131, it is sampled in 20-CY lots to comply with all applicable landfill regulations.

The results of the pilot structures sampling program were released in March 1993. Based on this information, the Army's expert panel on structure sampling has provided input concerning modifications of the sampling protocol developed as a result of panel meetings. These modifications were incorporated into the sampling protocol. As stated above, however, no decision has been made on the use of these protocols at RMA.

Additional sampling associated with the Army's pilot demolition program is also to be conducted as a treatability study. As part of this effort, sampling will be performed based on historical data to determine specific contaminant concentrations to support the testing of treatment methods. The results of this effort are not expected to be available until early 1994, and therefore cannot be incorporated into this document.

Again, predemolition sampling of structures to determine risk is inappropriate. The extent of post-demolition sampling and the actual waste analyses that will be performed cannot be determined until the final list of ARARs is approved since all sampling and analysis must satisfy all ARARs.

### 3.0 STRUCTURES MEDIUM GROUPS

### 3.1 INTRODUCTION

This section summarizes the background information relevant to the structures medium at RMA, describes how and why the structures medium groups were developed, and provides the quantity estimates that were developed for costing. The primary background document providing information on structures at RMA is the Task 24 Final Structures Survey report (EBASCO 1988/RIC88306R02).

### 3.2 BACKGROUND INFORMATION

The Structures Survey, performed in 1986, identified 982 structures at RMA based on extensive field observations and take-offs from available drawings. The 982 structures encompassed roughly 2.6 million square feet, and the total volume of structural materials was approximately 250,000 bank cubic yards (BCY). Structural materials, as used in this report, refer to all materials associated with the structures, not just load-bearing materials.

Of the 982 structures, 725 were located in three clusters: 524 (53 percent) were in South Plants, Sections 1 and 2; 118 (12 percent) were located in North Plants, Section 25; and 83 (9 percent) were located in the Railyard, Sections 3 and 4. The remaining 257 structures (26 percent) were distributed individually or in small clusters throughout RMA. The distribution of material volumes among clusters of structures roughly corresponded to the percentages given above. The history and use of the structures are summarized in the Structures DSA report. Since the 1987 survey, 42 structures have been removed, 42 new structures have been added. In addition, one structure, the Toxic Storage Yard, contains only berms and is being handled as part of the soils medium, and the designation of one structure has been changed from a single number to three individual numbers. Appendix A, Tables A.1-1 through A.1-5 list each of the RMA structures, which currently total 983. Appendix A, Table A.1-6 lists the structures that were removed, and Appendix A, Table A.1-7 lists those structures that may be used during the remediation process. All of the new structures have already been added to the appropriate structures medium groups, as discussed in Section 3.3.

### 3.3 STRUCTURES DAA MEDIUM GROUPS

Due to the complexity of the structures medium, all RMA structures were divided into medium groups during the DSA to aid the development and initial screening of remedial alternatives. The structures at RMA were divided into four medium groups including Future Use, No Potential Exposure; No Future Use, Nonmanufacturing History; No Future Use, Manufacturing History; and No Future Use, Agent History. During the DAA, the No Future Use, Manufacturing History Medium was subdivided into Process History and Non-Process History Subgroups. Appendix A, Tables A.1-1 through A.1-5 list the structures in each of the medium groups.

### 3.3.1 Future Use, No Potential Exposure

The Future Use, No Potential Exposure Medium Group consists of structures that are currently in use and are anticipated to have a post-remediation use. "Future use" is defined as having a long-term use after the RMA remediation is complete. There is no historical evidence to indicate structures within this medium group are contaminated; therefore, the ultimate disposition of these structures is outside the CERCLA process. No Action was the only alternative retained for this medium group. There are 25 structures in this medium group.

### 3.3.2 No Future Use, Nonmanufacturing History

The No Future Use, Nonmanufacturing History Medium Group includes all structures that did not serve in a manufacturing capacity and are not collocated with manufacturing history structures. These structures generally served administrative, utility, or support functions. There is no historical evidence to indicate structures within this medium group are contaminated; therefore, the ultimate disposition of these structures is outside the CERCLA process. No Action was the only alternative retained for this medium group. There are 103 structures in this medium group.

### 3.3.3 No Future Use, Manufacturing History

The No Future Use, Manufacturing History Medium Group refers to all structures in which employees manufactured, stored, transferred, or shipped any chemical products or raw materials.

Structures collocated with manufacturing history structures were also placed in this medium group because of their proximity to areas where chemical products or raw materials were handled. This is the largest medium group, containing 788 structures.

Structures having no potential for future use and having a manufacturing history were categorized into two subgroups based on knowledge of the specific manufacturing process history and contaminant release history for each structure. The Process History Subgroup consists of structures that were directly involved in a manufacturing process or have documented occurrences of spills. Based on historical knowledge and the results of the pilot structures sampling program, it was assumed that 30 percent of the floor space of any structure in this subgroup is potentially contaminated. There are 365 structures in this subgroup. The Non-Process History Subgroup refers to structures that do not have a manufacturing use history or documented spills, but that are collocated with process history structures. These structures served support functions, consisting of buildings such as change houses, cafeterias, and administrative buildings. The potential for contamination in these structures is low, but contamination is possible based on their location. It was assumed that the debris from this subgroup is potentially noncontaminated. There are 423 structures in this subgroup.

### 3.3.4 No Future Use, Agent History

The No Future Use, Agent History Medium Group consists of 67 structures in which employees contained, handled, or processed the Army chemical agents mustard (H, HD, or HT), isopropylmethyl phosphonofluoridate (GB), ethyl s-dimethylaminoethyl methylphosphonothiolate (VX), or lewisite (L).

Many of the structures in this medium group come under the control of three current or pending international agreements on chemical weapons. The provisions of these agreements will affect the waste management and remediation practices for structure in this medium group as follows:

 In September 1989, a Memorandum of Understanding was signed by the United States and the Soviet Union, and later adopted by Russia as successor. The memorandum sets up a mechanism to exchange data on chemical weapons production facilities and stockpiles, and also sets up on-site inspections to verify the data.

- In June 1990, a bilateral agreement on destruction and nonproduction of chemical weapons was signed by the United States and the Soviet Union and later adopted by Russia as successor. The goal of this agreement is the destruction of all but 5,000 tons of chemical agent for each country. It calls for on-site inspections of agent destruction areas and emptied storage areas and designates structures at RMA that are subject to the agreement (Plate 3.0-1), slating them for complete demolition. This agreement may be replaced with the multilateral chemical weapons convention, if agreement can be reached by both parties.
- The multilateral chemical weapons convention has the goal of complete destruction of chemical weapons and chemical weapons production facilities. This convention was signed by more than 120 countries in January 1993, and is scheduled to take effect on January 15, 1995. It applies to chemical weapons facilities designed, built, or used since January 1946. It allows on-site inspections and direct monitoring of destruction activities.

These agreements apply to designated agent-history structures, which are shown on Plate 3.0-1 and listed in Appendix A. The effect of the agreements is that international inspection teams have access to the structures and their records, and that the structures and their process equipment will be destroyed. Any remedial actions involving these structures must comply with the terms of the agreements including destruction of structures and equipment, cooperating with inspection teams, and preparing acceptable documentation.

As shown on Plate 3.0-1 the agreements also include support structures that are not part of the No Future Use, Agent History Medium Group since these structures were not directly related to Army chemical agent production. These structures will be handled as part of their respective medium groups, but additional disposal documentation will be necessary for these structures to

comply with the agreements. All structures governed by the treaties are denoted with a "T" in Appendix A.

Structures in the No Future Use, Agent History Medium Group may also contain other contamination that may be considered hazardous. The Army has determined that this group of structures must be handled in accordance with Army Material Command (AMC) AR 385-131, which governs the handling, decontamination, and disposal of agent-contaminated materials.

### 3.4 STRUCTURAL MATERIAL QUANTITY ESTIMATES

Quantity estimates for the structure medium were prepared in order to develop remedial alternative costs for the DAA. These data are based on field reconnaissance estimates and are considered sufficient for the purposes of this report. The 42 structures added since the Task 24 survey do not have survey data available, and are currently not included in the material quantity estimates. When this information becomes available, it may be incorporated into the cost estimates if it appears to have a significant cost impact. Of the 42 new structures, 17 are in the Process History Subgroup, 16 are in the Non-Process History Subgroup, and 9 are in the Future Use, No Potential Exposure Medium Group. Initial quantity estimates for additional process structures indicate that they represent less than 10 percent of the total volume and surface area of the group, and that they do not represent a significant increase in the current cost estimate.

The Task 24 survey collected a variety of information on each structure—including standing and collapsed volumes, material types, number of floors, etc.—that was used to create the Task 24 Database. For the purposes of the DAA, a number of assumptions and algorithms were applied to the database to estimate the quantities of materials for use in developing cost estimates for the various treatment alternatives. Appendix B details the process, and Tables 3.5-1 through 3.5-3 summarize the estimating results.

Some of the DAA quantity data were taken directly from the Task 24 Database, including the following:

- Standing volume of the structure
- Collapsed volume of the structure
- Square footage of the structure (structure footprint)
- Collapsed volume of the process equipment
- Collapsed volume of the piping

Costs for hot gas, steam cleaning, vacuum dusting, and sand blasting treatments and estimates of salvage quantities of individual material types (e.g., wood, metal, concrete) were calculated by applying algorithms to the Task 24 Database, which identified material types for walls, roofing, and foundations, and by applying the following assumptions. The roof material was assumed to be composed entirely of the reported type, as was the foundation material. The reported wall material was assumed to make up the remainder of the structure, including floors. The roof was assumed to be an 0.1 foot (ft) thick and to have an area that is the same as the building footprint. The volume of the roof material was subtracted from the total structure volume to determine the volume of the walls and interior materials. Foundation materials were reported separately. Structural material types were then added together and reported as total volumes for each type of material for each medium group.

The treatable surface areas for the treatment alternatives were calculated from these volume estimates based on the following assumptions. The in situ treatment of structures was assumed to be limited to the production areas. Based on an examination of structural blueprints of several production buildings, 30 percent of each process history structure's interior surface area and foundation was assumed to be directly involved in production, and that within that section of the building the treatment is applied to the floors and 5 ft up the walls. The treatable surface area for in situ sand blasting and vacuum dusting was assumed to include the production areas of buildings, and were assumed to be constructed of metal, concrete, tile, brick, or masonry. The treatable surface area for in situ steam cleaning was assumed to be similar to that for sand blasting and vacuum dusting; however, the wall types were limited to metal, concrete, tile, or masonry since steam cleaning is not applicable to surfaces that tend to absorb water. The

treatable surface area for in situ hot gas treatment was assumed to only be applicable to calculated only for nonflammable surfaces within production areas. The interior and exterior surface area for hot gas treatment of nonflammable debris was calculated assuming each story of a structure is 15 ft tall.

Quantities regarding the footprint area (the square footage of the structure) and the perimeter length areas were derived for the containment options. The footprint area was derived from the square footage of the structure, which was divided by the number of stories. The perimeter length was derived from the footprint area. The values of the factors depended on the size of the footprint area (Appendix B).

#### 3.5 ESTIMATES OF SALVAGEABLE MATERIALS

The only potentially salvageable material from the structures medium is metal. The data used for structural material types were modified to determine quantities of salvageable materials. The volume of metal was calculated based on the following assumptions. Salvageable metals included sheet metal, structural steel, as well as cleaned equipment and piping. The current scope of the chemical-process-related activities includes decontaminating and stockpiling all non agent process equipment and piping. The total estimated volume of salvageable stockpiled material was decreased by 20 percent to account for wastage. No structural steel or sheet steel will be reclaimed from structures in the Process History Subgroup due to the cost of cleaning the material and the low salvage value. All metal will be salvaged from the Non-Process History Subgroup with the total estimated volume decreased by 50 percent to account for wastage. Salvage is not applicable for the Agent History Medium Group.

# Material Volumes for No Future Use, Manufacturing History Medium Group -- Non-Process History Subgroup Table 3.5-1

423 210,108 cubic yards 30,201 cubic yards 558 cubic yards 326 cubic yards	17,411 cubic yards 1,155 cubic yards 1,785 cubic yards 2,351 cubic yards	2,810 cubic yards 2,864 cubic yards 1,575 cubic yards 98 cubic yards	262 cubic yards 186 cubic yards 1 cubic yards 1 cubic yards 2,517 cubic yards	407,730 Square feet 77,827 Square feet 51,070 linear feet 206,730 Square feet 160,660 Square feet 1,081,315 Square feet 1,651,979 Square feet
Total Number of Structures  Total Standing Volume  Total Collapsed Volume of Process Equipment  Total Collapsed Volume of Piping  Total Collapsed Volume of Piping	Concrete  Wood  Tile  Brick	Marca Marca Corrugated Metal Corrugated Asbestos Asbestos Board	Asphalt Shingle Built-Up/Hot Tar Sheet Metal Wood and Asphalt Scrap Metal Salvage Volume	Total Structure Pootprint Capping Area Total Structure Perimeter with 10-foot Buffer Treatable Surface Area for Sand Blasting and Vacuum Dusting Treatable Surface Area for Steam Cleaning Interior Surface Area Exterior and Interior Surface Area

# Material Volumes for No Future Use, Manufacturing History Medium Group – Process History Subgroup Table 3.5-2

365 631,646 cubic yards 74.487 cubic yards	3,907 cubic yards 1,113 cubic yards	43,484 cubic yards 333 cubic yards 5,494 cubic yards	6,162 cubic yards 10,725 cubic yards	2,007 cubic yards 3,403 cubic yards 1,085 cubic yards	0 cubic yards 914 cubic yards 372 cubic yards	286 cubic yards 157 cubic yards	5,806 cubic yards 882,562 square feet	173,117 square feet 57,102 linear feet 503,652 square feet 367,433 square feet 2 578,608 smare feet	3,812,865 square feet
Total Number of Structures Total Standing Volume Total Collarsed Volume	Total Collapsed Volume of Process Equipment Total Collapsed Volume of Piping Total Collapsed Volume of	Concrete Wood	Brick Masonry/Cinder Block	Corrugated Metal Corrugated Asbestos Asbestos Board	Fiberglass Asphalt Shingle Ruih, In Hor Tar	Sheet Metal Wood and Asphalt	Scrap Metal Salvage Volume Total Structure Footprint	Capping Area Total Structure Perimeter with 10-foot Buffer Treatable Surface Area for Sand Blasting and Vacuum Dusting Treatable Surface Area for Steam Cleaning	Exterior and Interior Surface Area

Note: Group contains 37 structures added since the 1987 Task 24 report (EBASCO 1987), for which material quantities were not calculated.

RMA.DAA 7/93 js

Total Collapsed Volume of Process Equipment Total Collapsed Volume of Piping Total Collapsed Volume of: Total Number of Structures Fotal Collapsed Volume Total Standing Volume

Concrete Mood Wood

Brick

Masonry/Cinder Block

Corrugated Asbestos Corrugated Metal

Asbestos Board

Fiberglass

Built-Up/Hot Tar Asphalt Shingle

Sheet Metal

Wood and Asphalt

Total Structure Footprint

Treatable Surface Area for Sand Blasting and Vacuum Dusting Total Structure Perimeter with 10-foot Buffer

Treatable Surface Area for Steam Cleaning

Interior Surface Area Exterior and Interior Surface Area

1,667,905 square feet 2,449,922 square feet

260,580 square feet

573,624 cubic yards 67,447 cubic yards 5,330 cubic yards 1,188 cubic yards

2,170 cubic yards 12,284 cubic yards 358,159 square fect 45,543 cubic yards 512,407 square feet 24,129 linear feet 2,260 cubic yards 2,819 cubic yards 1,151 cubic yards 218 cubic yards 500 cubic yards 136 cubic yards 289 cubic yards 74 cubic yards 0 cubic yards 3 cubic yards

# 4.0 FUTURE USE, NO POTENTIAL EXPOSURE

Structures in the Future Use, No Potential Exposure Medium Group include those structures with a history of administrative, utility, or support use; those currently in use; and those with a continued usefulness to RMA following remediation. The structures in this medium group are outside the CERCLA process; therefore, the only alternative retained for analysis in the DAA is the No Action alternative.

#### 4.1 ALTERNATIVE 1: NO ACTION

# 4.1.1 Description of Alternative

The No Action alternative involves no further action under the CERCLA process. Any actions appropriate for the structures in this medium group will occur outside the CERCLA process and will not be considered as part of the feasibility study (FS) process.

## 4.1.2 Analysis of Alternative

The seven EPA evaluation criteria (see the Executive Summary) do not apply to the Future Use, No Potential Exposure Medium Group because the medium group falls outside the CERCLA process.

# 5.0 NO FUTURE USE, NONMANUFACTURING HISTORY

Structures in the No Future Use, Nonmanufacturing History Medium Group include those structures with a history of administrative, utility, or support use; those not involved in manufacturing operations; and those not collocated with structures involved in manufacturing operations. In contrast to the future use structures, these structures will not have a continued usefulness to RMA following remediation. The structures in this medium group are outside the CERCLA process; therefore, the only alternative retained for analysis in the DAA is no action. The structures in this medium group will be handled in a manner similar to the Future Use, No Potential Exposure Medium Group with respect to the FS process.

#### 5.1 ALTERNATIVE 1: NO ACTION

# 5.1.1 <u>Description of Alternative</u>

The No Action alternative involves no further action under the CERCLA process. Any actions appropriate for the structures in this medium group will occur outside the CERCLA process and will not be considered as part of the FS process. Since these structures are not anticipated to have a future use, they may be removed and disposed.

#### 5.1.2 Analysis of Alternative

The seven EPA evaluation criteria (see the Executive Summary) do not apply to the No Future Use, Nonmanufacturing History Medium Group because this medium group falls outside the CERCLA process.

# 6.0 NO FUTURE USE, MANUFACTURING HISTORY-PROCESS HISTORY SUBGROUP

Structures in the No Future Use, Manufacturing History-Process History Subgroup include those structures that were directly involved with manufacturing at RMA, or those that were sites of documented chemical spills. The use histories of the structures in this subgroup include pesticide and various chemical manufacturing, chemical storage, and chemical handling activities. No action, containment, treatment, and disposal options are considered among the alternatives for this medium group. Each alternative has been described and analyzed according to the seven EPA evaluation criteria (see the Executive Summary). As described in Section 2, most of the alternatives and analyses developed for the structures medium are very similar. Accordingly, following the description and analysis of the No Action and Containment alternatives (Sections 6.1 and 6.2), Section 6.3 presents a description of the general alternative for this medium group (demolition, and landfilling), as well as a general analysis of the alternative against the seven EPA evaluation criteria. The subsequent descriptions and analyses (Sections 6.4 through 6.13) focus on the differences each alternative has from the general alternative. Refer to Table 6.0-1 for the comparative analysis in tabular format. ARARs are discussed for each alternative as part of the analysis of alternative section. Sampling for this subgroup is described in Section 2.4.

It was assumed that PCBs, ACM, process equipment, piping, and tanks will be handled under the scope of other ongoing actions. It was assumed that all ACM, PCBs, process equipment, piping, and tanks are removed from the structures prior to initiating the structures remediation. If any of these items are encountered during the structures remediation, it will be handled as an integral part of the remediation process. Moreover, the cost of removal and disposal of any of these was assumed to be handled under the appropriate action and was not included as part of the remediation costs developed for the DAA. No structural steel or sheet steel will be salvaged from the structures in the Process History Subgroup due to the cost associated with cleaning the material and the relatively low salvage value.

#### 6.1 ALTERNATIVE 1: NO ACTION

## 6.1.1 Description of Alternative

The No Action alternative involves no further action beyond existing measures; it may be applicable to the Process History Subgroup only if IRAs preceding the Record of Decision (ROD) have adequately remediated the structures in this subgroup. Given the use histories of the structures and the interaction between alternatives developed for the structures medium and those developed for the soils medium, it was assumed that some remedial activity has to be undertaken.

## 6.1.2 Analysis of Alternative

# 6.1.2.1 Overall Protection of Human Health and the Environment

Alternative 1 does not provide protection to human health and the environment since the potential for exposure to contamination remains unchanged.

## 6.1.2.2 Compliance with ARARs

Action-specific ARARs do not apply to this alternative since no action is taken. This alternative complies with location-specific ARARs.

#### 6.1.2.3 Long-Term Effectiveness and Permanence

Alternative 1 does not provide long-term effectiveness or permanence. The residual risk increases with time because there is a greater chance for the release of contaminants as the structures deteriorate. The current access controls are inadequate for the long term and the habitat remains unchanged.

#### 6.1.2.4 Reduction of TMV

Alternative 1 does not reduce contaminant TMV since this alternative does not include treatment or containment.

#### 6.1.2.5 Short-Term Effectiveness

Since there are no actions taken under this alternative, no worker or community protection is necessary and there are no environmental impacts caused by the remediation. Alternative 1 may not achieve remedial action objectives (RAOs).

# 6.1.2.6 Implementability

Alternative 1 is not administratively feasible because further deterioration of the structures may pose a physical and chemical hazard to human health and the environment.

#### 6.1.2.7 Cost

The cost of this alternative is \$0.00.

#### 6.2 ALTERNATIVE 2: PIPE PLUGS, LOCKS/BOARDS/FENCES/SIGNS

## 6.2.1 Description of Alternative

Alternative 2 includes plugging pipes within the structure to immobilize contaminants and using a combination of locks, boards, fences, and signs to prevent access to the structure. Alternative 2, as retained in the DSA, included the option of filling entire rooms or structures with grout to immobilize contamination. The initial DAA analysis determined that filling a whole building with grout had a high cost and was difficult to implement without offering significantly better permanence, protectiveness, or reduction in TMV compared to pipe plugs in combination with locks, boards, fences, and signs. Therefore, only pipe plugs are considered as part of Alternative 2. Pipe plugs are described in detail in the Technology Description Volume, Section 13, and locks, boards, fences, and signs are described in the Technology Description Volume, Section 3.

Before Alternative 2 can be implemented, each structure in this subgroup must be visually examined. An interior and exterior examination is performed to determine the structural integrity of the building. If any of the structures are found to be unsafe for the implementation of Alternative 2, the structures are repaired to ensure the safety of workers in and around the structures. The necessary repairs for many of the structures in this subgroup may represent a

significant effort. It was assumed that there is no ACM associated with these structures at the time of remediation since the scope of the Asbestos IRA, currently in progress, is to remove all ACM from structures. This task is scheduled to be completed prior to the structures remediation. The visual inspection of the structures also determines whether there is any residual ACM.

Following the examination and repair of the structure, pipe plugging is implemented as necessary. Any process piping is filled with grout to immobilize and contain contaminants. Concurrent with the pipe plugging operations, locks, boards, fences, and signs are installed as appropriate to prevent access to the structure. Due to the unique configuration and differing accessibility of structures in this subgroup, the types and quantities of locks, boards, fences, or signs are evaluated separately for each structure.

Since Alternative 2 is a containment option, the structures remain intact indefinitely; therefore, inspections and repairs are performed on a regular basis as part of this alternative.

# 6.2.2 Analysis of Alternative

# 6.2.2.1 Overall Protection of Human Health and the Environment

Alternative 2 is somewhat protective of human health and the environment because it prevents contaminant migration and eliminates contact with contaminants by plugging pipes and preventing access to the structures. Although the contaminants in pipes are immobilized and access to the structure is controlled, overall protectiveness is limited because the structures remain intact and no contaminants are removed from the structure. Further deterioration of the structures increases the physical hazards related to the structures.

#### 6.2.2.2 Compliance with ARARs

Alternative 2 complies with applicable action- and location-specific ARARs. Action-specific ARARs regarding pipe plugging, which are unique to this alternative, are presented in the Technology Description Volume, Appendix A, Table A-25. Other applicable action-specific ARARs related to this alternative include institutional controls (Technology Description Volume,

Appendix A, Table A-35). ARARs regarding institutional controls address access restrictions, land use/deed restrictions, and monitoring. The location-specific ARARs applicable to this alternative are listed in the Structures DSA, Volume I, Appendix A, Table 2A.

## 6.2.2.3 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence of this alternative is questionable. There is moderate residual risk since the structures remain intact and no contaminants are removed from the structures. The potential exists for migration of contaminants remaining in the structures.

The controls are adequate assuming that preventive maintenance and long-term monitoring, which prevent the re-establishment of contaminant migration pathways out of the pipes and structure and the subsequent exposure to humans or wildlife, occur for an indefinite period of time. Maintenance and monitoring for an indefinite period of time, however, is impractical.

The habitat remains unchanged and may actually be reduced for species that use the structures as part of their habitat. However, some burrowing or invasive species (e.g., rodents, insects) may eventually regain access to the structure and re-establish habitat.

# 6.2.2.4 Reduction of TMV

Plugging pipes in combination with locks, boards, fences, and signs to prevent access is effective in reducing mobility of contaminants; however, it does not reduce volume or toxicity of any contaminants present. The volume of contaminated materials is slightly increased by exposing the grout to contaminants resident in the pipes. Toxicity remains unchanged because contaminants are immobilized in their present form without undergoing treatment. The mobility reduction is reversible should the access restrictions or pipe plugs fail.

Pipe plugging produces a very small quantity of solid waste consisting of used grout that could potentially be hazardous. Locks, boards, fences, and signs produce no treatment residuals.

#### 6.2.2.5 Short-Term Effectiveness

Standard worker protection is necessary during pipe plugging and access restriction operations. Alternative 2 has a minimal effect on the community, and no additional effect on habitat or the environment during implementation. It is anticipated that RAOs would be attained within 1 year under this alternative.

## 6.2.2.6 Implementability

Alternative 2 is both administratively and technically implementable, with services and materials readily available. Pipe plugging is technically simple, relatively inexpensive, and easily implementable for most piping runs. Services and materials for structural repair as well as for the locks, boards, fences, and signs are readily available.

#### 6.2.2.7 Cost

It was assumed for cost-estimating purposes that pipe plugs are applied to the entire piping volume of the structure under remediation. The cost of Alternative 2 includes annual ambient air monitoring of the structure performed a dedicated high-volume air sampler. Alternative 2 has been applied to 365 structures in the Process History Subgroup. The present worth cost of Alternative 2 is approximately \$38,300,000. These costs include monitoring and long-term maintenance for a 30-year period, after which the need for maintenance and monitoring is re-evaluated. It is anticipated that maintenance and monitoring will continue past the 30-year period at an approximate annual cost of \$338,000.

#### 6.3 GENERAL ALTERNATIVE: DEMOLITION, CONTAINMENT

As described in Sections 2 and 6, most of the alternatives developed for this medium group are very similar, i.e., they incorporate the options of demolition and landfilling. This section describes how these process options are applied, in general, to the alternatives. Subsequent discussions will focus on the differences of the developed alternatives.

# 6.3.1 <u>Description of Alternative</u>

The general alternative for this medium group includes demolishing the structure, and stockpiling, transporting, and disposing the debris. Demolition and transportation are described in detail in Section 4 and containment in Section 6 of the Technology Description Volume.

Before any of the alternatives can be implemented, each structure in the medium group must be visually examined. An interior and exterior examination is used to determine the structural integrity of the building. If any of the structures are found to be unsafe for implementation of the alternatives, the structures are repaired to ensure the safety of workers in and around the structures. The necessary repairs for many of the structures may be significant. It was assumed that 10 percent of structures need to be repaired. In addition, it was assumed that there is no ACM associated with the structures at the time of remediation since the scope of the Asbestos IRA, currently in progress, is to remove all ACM from structures. (The visual inspection of the structures determines whether there is any remaining ACM.) The asbestos IRA is scheduled to be completed prior to structures remediation. It was also assumed that all PCBs, process equipment, piping, and tanks are removed prior to the structures remediation.

Once the structure is determined to be safe for remediation activities (based on inspections and repairs), demolition commences. In the DSA, detonation and dismantling were both retained as possible demolition techniques. The initial DAA analysis determined, however, that detonation was not as widely applicable as dismantling, and that it would not allow efficient waste segregation. In addition, detonation is costly and poses a greater threat to the community than does dismantling because of the large, uncontrolled amount of dust that is released, and to workers because of the uncontrolled nature of the process leading to the potential release of contaminants. Therefore, dismantling is the demolition technique used for all of the alternatives.

Dismantling consists of a combination of techniques using equipment such as a ball and crane or a clamshell, or by performing piece-by-piece disassembly, sawing, or crushing. Standard dust-control measures are used throughout the demolition process to protect workers and the

community. This includes wetting the working area with water or surfactants and covering the area around the structure with gravel or asphalt. Materials not salvaged are placed in a bermed, dirt, or concrete staging area. If necessary, the debris is segregated into potentially hazardous and nonhazardous waste as the building is dismantled and placed in separate containment areas. The debris is sized for disposal concurrent with stockpiling. In general, debris is sized no larger than 1- by 1-ft pieces when it is to be disposed in a landfill or used as fill. Rebar does not have to be separated from concrete, but rebar should not be exposed. The debris is transported by truck to the disposal site. For the Process History Subgroup, 30 percent of the structure was assumed to be potentially hazardous. For the Non-Process History Subgroup (Section 7), all of the debris was assumed to be potentially nonhazardous. The varying requirements for on-post versus off-post disposal and for hazardous versus nonhazardous disposal are discussed below for each alternative. For most alternatives involving treatment, the disposal option is on-post nonhazardous waste landfilling. However, the debris could also be consolidated and used as fill in a containment area (as in Alternative 21a), and aggregate may be used as biota barrier in capping and consolidation alternatives. Once the structures and debris are removed, the site is reclaimed by backfilling and grading the area. In some cases, the area may be capped and revegetated with native plants and grasses as part of soils remediation. It is assumed that 80 percent of the structures are located in areas that are revegitated by the soils medium. In those areas the structures sites will be backfilled and graded only. The remaining 20 percent of the structures sites will be backfilled, graded, covered with topsoil and revegitated as part of the structures remediation.

# 6.3.2 Analysis of Alternative

# 6.3.2.1 Overall Protection of Human Health and the Environment

Since the structures are demolished and removed and the debris is contained by containment, the alternatives are protective of human health and the environment. The degree of protection may change slightly based on the specific treatments used and the type of disposal. In general, however, overall protectiveness of the common alternatives does not change significantly.

# 6.3.2.2 Compliance with ARARs

Action-specific ARARs that apply to all of the alternatives in the Process History Subgroup include those related to demolition of structures (Technology Description Volume, Appendix A, Table A-3), conventional excavation and backfill (Technology Description Volume, Appendix A, Table A-1), and transportation of wastes (Technology Description Volume, Appendix A, Table A-34). ARARs regarding demolition address worker protection, wildlife protection, noise control, and air emission controls. ARARs regarding excavation and backfill address worker protection, protection of wildlife, noise abatement, air emission control, waste characterization and management, and groundwater injection. ARARs regarding transportation of wastes address transportation of hazardous wastes, both on and off post. All alternatives, with the exception of the No Action alternative, are in compliance with these action-specific ARARs. Location-specific ARARs are included in the Structures DSA, Volume I, Appendix A, Table 2A. Unique action-specific ARARs that apply to individual alternatives within the subgroup are described below.

# 6.3.2.3 Long-Term Effectiveness and Permanence

Since the debris is contained, the residual risk is low. The controls are adequate so long as long-term maintenance and monitoring is performed regularly at the disposal area. Although the overall habitat is improved because the structures are removed and the site is reclaimed, it is limited at any on-post disposal areas and at capped areas because burrowing animals are excluded.

# 6.3.2.4 Reduction of TMV

Containment of structural debris through containment reduces the mobility of contaminants, but does not change the toxicity or volume of any contaminants present. In general, the reduction in contaminant mobility is permanent, but if the integrity of the disposal area is breached, the reduction in contaminant mobility is reversed. Long-term monitoring and maintenance of the disposal area helps ensure the permanence of mobility reduction. Containment of structural debris produces no treatment residuals.

#### 6.3.2.5 Short-Term Effectiveness

Standard worker protection is necessary during demolition, transportation, and containment. The greatest potential threat to the community is the migration of potentially contaminated dust off post. Dust controls must be implemented throughout the remediation activities to minimize the quantity of dust produced. Assuming adequate dust control measures are used, the impact to the environment is minimal since the remedial actions are short in duration. In general, RAOs are achieved in less than 5 years.

# 6.3.2.6 Implementability

Demolition, transportation, and containment are standard, reliable technologies. They are technically feasible, with services and materials readily available. Demolition, transportation, and containment are also administratively feasible, but there are long-term liability concerns associated with off-post disposal.

#### 6.3.2.7 Cost

The costs are unique to each alternative and are discussed individually in the following sections.

# 6.4 ALTERNATIVE 8: HOT GAS, DISMANTLING, SALVAGE, ON-POST NONHAZARDOUS WASTE LANDFILL

#### 6.4.1 Description of Alternative

Alternative 8 includes administering in situ hot gas treatment, dismantling the structure, salvaging decontaminated scrap metal, and transporting and disposing the resulting nonhazardous debris in an on-post nonhazardous waste landfill. Hot gas treatment is described in the Technology Description Volume, Section 8.

In situ hot gas treatment for structures is limited to those areas of a structure where production operations or documented spills occurred. Hot gas is an aggressive treatment that is limited to organic contaminants on nonflammable surfaces such as metal and masonry. Hot gas treatment consists of injecting hot gases into a sealed room to thermally desorb contaminants from

structural surfaces. Pre-treatment of the structure includes isolating the treatment area and constructing off gas treatment and collection systems. The treatment produces a gaseous sidestream in which the entrained contaminants are cooled and treated by incineration. Due to the limited applicability of hot gas treatment, treatment by this method may not be possible for some portions of some structures.

# 6.4.2 Analysis of Alternative

#### 6.4.2.1 Overall Protection of Human Health and the Environment

Due to the limited applicability of hot gas treatment, Alternative 8 may not fully treat contaminated structures. However, this alternative is protective of human health and the environment because the structural debris is disposed in a controlled landfill.

## 6.4.2.2 Compliance with ARARs

The alternative complies with action- and location-specific ARARs. ARARs regarding hot gas treatment of structures are presented in the Technology Description Volume, Appendix A, Table A-15, and ARARs regarding nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

#### 6.4.2.3 Long-Term Effectiveness and Permanence

If the contaminants of interest are not successfully treated by hot gas, residual risk may not be lowered as compared to containment without treatment. As long as the landfill is maintained and monitored, however, this alternative has adequate long-term effectiveness and permanence.

#### 6.4.2.4 Reduction of TMV

This alternative is effective in irreversibly reducing organic contaminant TMV through the hot gas treatment process and treatment of contaminated off gases. The TMV of inorganic contaminants are not affected by hot gas treatment.

#### 6.4.2.5 Short-Term Effectiveness

Extensive worker protection is required during hot gas treatment due to the aggressive nature of the process. The potentially hazardous off gases must be collected and treated to ensure the safety of the workers and the community. Hot gas treatment has the potential to cause additional environmental impacts due to the chance of fire during treatment. RAOs are achieved within 1 to 3 years.

# 6.4.2.6 Implementability

Implementation of hot gas treatment is limited to treating organic contaminants. The suitability of this option must be determined on a case-by-case basis due to the limited number of structures and compounds to which this treatment may be applied. Materials undergoing treatment must be stable at the high operating temperatures of the process and combustible materials must be removed before application of the process. The ability to seal the structure may limit the effectiveness of hot gas treatment due to heat loss or gas leakage through gaps in the structure. Structural repair to eliminate leakage may be required prior to treatment. In addition, the complexity of the physical configuration of the structure (i.e., the inaccessibility of corners or recesses) may prevent the even distribution of heat, and the physical properties of the structure may reduce the diffusion of contaminants into the gas stream (e.g., smooth steel may release contaminants more readily than porous concrete).

To date, hot gas technology has only been developed at pilot scale; its effectiveness at full scale is unknown. In addition, it is not a commercially available technology and technical expertise is limited. The alternative is administratively feasible.

#### 6.4.2.7 Cost

The cost of Alternative 8 includes incineration treatment of the emitted off gases. The cost is based on the assumption that only interior surfaces are treated. It is likely that some additional cost may be incurred to seal or repair structures before treatment. There are 365 structures amenable to treatment by this process. The structural debris is to be loaded on trucks and

transported to the on-post landfill located between North Plants and Basin F; therefore, the material is hauled an average of 4 miles. The present worth cost of this alternative, including transportation, is approximately \$119,000,000.

# 6.5 ALTERNATIVE 9: VACUUM DUSTING, DISMANTLING, SALVAGE, ON-POST NONHAZARDOUS WASTE LANDFILL

# 6.5.1 Description of Alternative

Alternative 9 includes in situ vacuum dusting, dismantling the structure, salvaging decontaminated scrap metal, transporting and disposing the resulting nonhazardous debris in an on-post nonhazardous waste landfill, and backfilling the structure excavation. Vacuum dusting is discussed in the Technology Description Volume, Section 13.

In situ vacuum dusting removes dust and particulates from structural surfaces. The dust and particulates are collected on a high-efficiency particulate (HEPA) filter that is then drummed and disposed. No pre-treatment of the structure is necessary other than to ensure the safety of the workers and to ensure that all surfaces to be treated are accessible. Vacuum dusting does not remove any contamination that is physically or chemically bound to a surface. Due to this limitation, some contamination may not be removed using this method.

# 6.5.2 Analysis of Alternative

#### 6.5.2.1 Overall Protection of Human Health and the Environment

Alternative 9 is protective of human health and the environment because contaminated dust is removed and the structural debris is disposed in a contained, controlled landfill.

# 6.5.2.2 Compliance with ARARs

Alternative 9 complies with action- and location-specific ARARs. The ARARs regarding vacuum dusting are presented in the Technology Description Volume, Appendix A, Table A-26, and ARARs regarding nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

# 6.5.2.3 Long-Term Effectiveness and Permanence

The addition of vacuum dusting prior to landfilling somewhat lowers the residual risk related to contaminated dust in structures. Residual risk is not reduced for structures with extensive nonparticulate contamination. As long as the landfill is maintained, this alternative has adequate long-term protectiveness and permanence.

#### 6.5.2.4 Reduction of TMV

Alternative 9 is effective in reducing the mobility of particulate contaminants through vacuum dusting and in reducing the mobility of residual contamination associated with structures through containment; however, it does not reduce volume or toxicity. Vacuum dusting produces a low-volume solid waste stream that must be treated and disposed. There are 365 structures amenable to this option.

#### 6.5.2.5 Short-Term Effectiveness

The complexity of the physical configuration of the structure could limit the effectiveness of vacuum dusting due to the inaccessibility of corners or recesses. Standard worker protection is required during vacuum dusting. Implementation of this alternative is not anticipated to have any adverse affects on the environment. RAOs are achieved within 1 to 3 years.

#### 6.5.2.6 Implementability

Alternative 9 is both technically and administratively feasible for structures in this medium group. Vacuum dusting is limited to removing contaminants associated with dusts or particulates. As a result, the effectiveness of this alternative for all structures in this subgroup is limited and must be evaluated on a structure-by-structure basis. Vacuum dusting is a proven technology, with materials and services readily available.

#### 6.5.2.7 Cost

The cost of Alternative 9 assumes treatment and disposal of generated waste following vacuum dusting and demolition and that only interior surfaces are treated by vacuum dusting. This

alternative treats 365 structures. The present worth cost of this alternative is approximately \$49,700,000, including transportation.

# 6.6 ALTERNATIVE 9a: STEAM CLEANING, DISMANTLING, SALVAGE, ON-POST NONHAZARDOUS WASTE LANDFILL

# 6.6.1 Description of Alternative

Alternative 9a includes in situ steam cleaning, dismantling the structure, salvaging decontaminated scrap metal, transporting and consolidating the resulting nonhazardous debris in an on-post nonhazardous waste landfill, and backfilling the structure excavation. Steam cleaning is discussed in the Technology Description Volume, Section 13.

In situ steam cleaning for structures is limited to areas of a structure where production operations or documented spills occurred. Steam cleaning removes contaminants from building materials and surfaces using heated water applied under pressure, but is limited to nonporous surfaces such as metal and concrete. The treatment produces a liquid sidestream containing the removed contaminants; this sidestream is treated on site by filtration and carbon adsorption and the liquid is recycled back into the steam cleaning process. This minimizes the volume of waste produced and the amount of water needed for treatment. Pre-treatment of the structure includes containing the treatment area and collecting and treating the liquid waste produced. Some portions of the structure with potential contamination may not be amenable to this treatment since steam cleaning is not applicable to porous surfaces. In addition, contamination that has migrated below the floor surface of materials to be steam cleaned cannot be removed by this process.

#### 6.6.2 Analysis of Alternative

#### 6.6.2.1 Overall Protection of Human Health and the Environment

Although steam cleaning only treats contaminants on nonporous surfaces only, Alternative 9a is protective of human health and the environment because the structural debris is disposed in a controlled, contained landfill.

## 6.6.2.2 Compliance with ARARs

Alternative 9a complies with action- and location-specific ARARs. ARARs regarding steam cleaning are presented in the Technology Description Volume, Appendix A, Table A-27, and ARARs regarding nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

#### 6.6.2.3 Long-Term Effectiveness and Permanence

Alternative 9a lowers the residual risk for structures with contamination on nonporous surfaces compared to containment without treatment.

#### 6.6.2.4 Reduction of TMV

Steam cleaning irreversibly reduces the mobility and volume of contaminants on nonporous surfaces. Contaminants exhibiting toxicity are simply transferred from the structure to the wastewater, which must be treated or disposed.

#### 6.6.2.5 Short-Term Effectiveness

Worker exposure controls are needed during steam cleaning. Standard worker protection is required during steam cleaning and demolition operations, with an emphasis on dust control during demolition. Implementation of this alternative is not anticipated to have any additional adverse affects on the environment or surrounding community. It is anticipated that RAOs are achieved in 1 to 3 years.

#### 6.6.2.6 Implementability

Alternative 9a is both technically and administratively feasible for structures in this medium group. Implementation of the steam cleaning option is limited to removing surface contaminants associated with nonporous materials. Although steam cleaning can be customized to include solvents or grit to enhance removal efficiencies, the complexity of the physical configuration of the structure could limit the effectiveness of this treatment due to the inaccessibility of corners or recesses. As a result, the effectiveness of this alternative for all structures in this subgroup

must be evaluated on a structure-by-structure basis. Steam cleaning is a proven technology, with materials and services readily available.

#### 6.6.2.7 Cost

The cost of Alternative 9a assumes that only interior surfaces are treated and that the wastewater generated during the process is treated and disposed. There are 365 structures amenable to treatment by this option. The present worth cost of this alternative is approximately \$50,300,000, including transportation.

# 6.7 ALTERNATIVE 10: SAND BLASTING, DISMANTLING, SALVAGE, ON-POST NONHAZARDOUS WASTE LANDFILL

## 6.7.1 Description of Alternative

Alternative 10 includes in situ sand blasting, dismantling the structure, salvaging decontaminated scrap metal, consolidating and transporting the resulting nonhazardous debris to an on-post non-hazardous waste landfill, and backfilling the structure excavation. Sand blasting is discussed in the Technology Description Volume, Section 13.

In situ sand blasting for structures is limited to areas of a structure where production operations or documented spills occurred. Sand blasting consists of the physical removal of contaminated surfaces via abrasion and is effective at removing surface contamination that has not penetrated the material to a depth greater than 1/2 inch. Sand blasting is applicable to most surfaces except wood, glass, or certain polymers (e.g., transite or Plexiglas). Sand blasting is an acceptable best demonstrated available technology (BDAT) for both metal and nonmetal contaminants in debris regulated by RCRA. The treatment produces a solid sidestream containing used grit, removed surface materials, and removed contaminants. The grit is separated from the other particles on site and recycled back into the sand blasting process. This minimizes the volume of waste produced and the amount of grit needed for treatment. Pre-treatment of the structure includes containing the treatment area and collecting and treating the solid waste produced. Sand blasting is the most widely applicable in situ treatment with respect to both structural materials and

potential contaminants, although some portions of the structure with potential contamination may not be able to be treated by this method since sand blasting is not applicable to certain surfaces.

# 6.7.2 Analysis of Alternative

#### 6.7.2.1 Overall Protection of Human Health and the Environment

Sand blasting increases the protection of human health and the environment compared to containment alone by removing the contaminated surfaces of most structural materials.

## 6.7.2.2 Compliance with ARARs

Alternative 10 complies with action- and location-specific ARARs. The ARARs regarding sand blasting are presented in the Technology Description Volume, Appendix A, Table A-28, and those for nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

## 6.7.2.3 Long-Term Effectiveness and Permanence

Sand blasting lowers residual risk by removing surface contamination, and it satisfies the BDAT standard for both metal and nonmetal contaminants associated with structural material. However, the effectiveness of this alternative varies based on the accessibility of the structural surfaces to the sand blasting equipment.

#### 6.7.2.4 Reduction of TMV

Sand blasting irreversibly reduces the mobility and volume of surface contamination. The treatment is not applicable to wood, glass, and certain polymers such as transite or plexiglas. The treatment residuals, consisting of a solid waste stream containing any removed contaminants from the structure and grit, must be characterized and properly disposed. Contaminant toxicity can be reduced if the waste stream is treated. There are 519,004 SF of treatable surfaces amenable to this option.

#### 6.7.2.5 Short-Term Effectiveness

Standard worker protection is required during sand blasting operations. The additional environmental risks are low so long as the contaminated grit can be effectively contained and collected. RAOs are attained within 1 to 3 years.

## 6.7.2.6 Implementability

Alternative 10 is both technically and administratively feasible for structures in this subgroup. Sand blasting is limited to removing near-surface contaminants on most surfaces. Implementability of this alternative varies from structure to structure. The complexity of the physical configuration of the structure could limit the degree of treatment due to the inaccessibility of corners or recesses. Depending on the configuration of each structure, therefore, not all contaminated surfaces may be treated. Sand blasting is a proven technology, with materials and services readily available.

#### 6.7.2.7 Cost

The cost of Alternative 10 assumes that removed materials and spent abrasive are disposed in an on-post nonhazardous waste landfill or consolidated as on-post fill and that only interior surfaces are treated. There are 365 structures that are amenable to treatment under this alternative. The present worth cost of this alternative is \$51,900,000, including transportation.

# 6.8 ALTERNATIVE 12: DISMANTLING, SALVAGE, OFF-POST ROTARY KILN INCINERATION, OFF-POST HAZARDOUS WASTE LANDFILL

# 6.8.1 Description of Alternative

Alternative 12 includes dismantling the structure, salvaging decontaminated scrap metal, transporting the debris to an on-post transfer station, backfilling the structure excavation, transporting and incinerating the debris in an off-post rotary kiln incinerator, and landfilling the incinerator ash in the off-post hazardous waste landfill. Incineration is discussed in the Technology Description Volume, Section 7.

Alternative 12 treats all nonsalvagable material through off-post incineration. This requires that the debris be sized to less than 1- by 1-ft pieces. All rebar is removed from concrete using an on-site crusher. Off-post transportation requires the waste to be manifested in accordance with Department of Transportation (DOT), RCRA, and state requirements. Certificates of destruction are provided for all waste that is to be incinerated. It was assumed that the resulting ash is disposed in an off-post hazardous waste landfill, with transportation between the incinerator and the landfill being the responsibility of the incinerator operator.

#### 6.8.2 Analysis of Alternative

#### 6.8.2.1 Overall Protection of Human Health and the Environment

Alternative 12 offers increased protection of human health and the environment compared to containment without treatment through incineration of the debris and containment in an off-post hazardous waste landfill.

## 6.8.2.2 Compliance with ARARs

Alternative 12 complies with action- and location-specific ARARs. ARARs regarding off-post rotary kiln incineration are presented in the Technology Description Volume, Appendix A, Table A-12, and ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

# 6.8.2.3 Long-Term Effectiveness and Permanence

This alternative has a very low residual risk, effectively destroying all organic contaminants (although inorganic contaminants are not treated). There are adequate controls for landfilled ash—which is to be disposed by the incinerator operator—but there is no direct control over long-term maintenance and monitoring. Wildlife habitat is improved at the site.

#### 6.8.2.4 Reduction of TMV

This alternative irreversibly reduces contaminant TMV through the complete thermal destruction of organic contaminants. Off gases produced during the incineration process must be treated.

The rotary kiln, the most common type of hazardous waste incinerator, most effectively processes demolition debris. This process is effective in treating organic contaminants, but ineffective in treating inorganic contaminants. Air emissions from the process must be treated before they are discharged to the atmosphere.

# 6.8.2.5 Short-Term Effectiveness

No additional worker protection is necessary since incineration occurs off post. Since the waste is being transported a significant distance (at least several hundred miles) off post, there is a much greater potential for environmental impacts such as accidents during transportation. RAOs are attained within 1 to 3 years.

# 6.8.2.6 Implementability

This alternative is technically and administratively feasible, with materials and services readily available, although technical feasibility concerns include extensive materials processing and limited reduction of total material volume, and administrative feasibility concerns include availability of commercial incineration capacity and long-term liability associated with off-post incineration and disposal. Off-post treatment and disposal options offer no direct control over the processes and the long-term monitoring and maintenance of the landfill.

#### 6.8.2.7 Cost

For cost-estimating purposes, it was assumed that dismantling is used to demolish the structure and that the entire structure volume is shreddable and is incinerated. There are 365 structures amenable to this alternative. Costs include transportation to an off-post incinerator and subsequent disposal by the incinerator operator in a hazardous waste landfill. The present worth cost for this alternative is approximately \$528,000,000, making Alternative 12 the most expensive alternative for this subgroup.

# 6.9 ALTERNATIVE 13: DISMANTLING, SALVAGE, ON-POST ROTARY KILN INCINERATION, ON-POST NONHAZARDOUS WASTE LANDFILL

## 6.9.1 Description of Alternative

Alternative 13 includes dismantling the structure, salvaging decontaminated scrap metal, transporting the debris to the on-post rotary kiln incinerator, disposing the resulting ash in an on-post nonhazardous waste landfill, and backfilling the structure excavation. This alternative is very similar to Alternative 12 (Section 6.8), except that the incineration takes place on post and disposal occurs in an on-post nonhazardous waste landfill.

This alternative treats the materials by on-post incineration and requires that the debris be sized to less than 1- by 1-ft pieces. All rebar is removed from concrete using an on-site crusher.

#### 6.9.2 Analysis of Alternative

#### 6.9.2.1 Overall Protection of Human Health and the Environment

Alternative 13 is protective of human health and the environment by destroying organic contaminants through incineration and by containing debris in an on-post landfill. On-post treatment and disposal offers direct control of activities, which makes this alternative more protective than Alternative 12.

#### 6.9.2.2 Compliance with ARARs

Alternative 12 complies with action- and location-specific ARARs. ARARs regarding to on-post rotary kiln incineration are presented in the Technology Description Volume, Appendix A, Table A-11, and ARARs regarding nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

#### 6.9.2.3 Long-Term Effectiveness and Permanence

Since the incinerated debris was assumed to be nonhazardous, there is, in general, low residual risk associated with Alternative 13. The residual risk may increase, however, if there are inorganic contaminants present in the structural materials. Adequate and reliable controls are

ensured by long-term monitoring and maintenance of the on-post landfill. Wildlife habitat is temporarily eliminated at the incineration site.

#### 6.9.2.4 Reduction of TMV

This alternative irreversibly reduces contaminant TMV through the complete thermal destruction of organic contaminants. It is ineffective in treating inorganic contaminants. Off gases produced during the incineration process must be treated. The rotary kiln, currently the most conventional design type for hazardous waste incineration, most effectively processes demolition debris. Air emissions from the process must also be treated before discharge to the atmosphere.

#### 6.9.2.5 Short-Term Effectiveness

Worker protection is necessary for incineration operation and off gases in the air emissions must be effectively controlled. RAOs are achieved in 1 to 5 years.

# 6.9.2.6 Implementability

This alternative is administratively and technically feasible, with materials and services readily available. However, this alternative may be difficult to implement due to the need for material processing, possibly extensive fuel requirements, and potential air emissions and ash disposal concerns for structures contaminated with inorganics. Furthermore, regulatory and community acceptance is a potential concern.

#### 6.9.2.7 Cost

It was assumed that the entire structure volume is shredded and incinerated. There are 365 structures that are amenable to treatment under this alternative. The present worth cost for this alternative is approximately \$95,800,000.

# 6.10 ALTERNATIVE 19: DISMANTLING, SALVAGE, ON-POST HAZARDOUS WASTE LANDFILL

#### 6.10.1 Description of Alternative

Alternative 19 includes dismantling the structure, salvaging decontaminated scrap metal, transporting the debris to an on-post hazardous waste landfill, and backfilling the structure excavation. This alternative is basically the same as the general alternative described in Section 6.3 since there is no additional treatment involved.

# 6.10.2 Analysis of Alternative

#### 6.10.2.1 Overall Protection of Human Health and the Environment

Without treatment, the disposal of the structural debris in an on-post hazardous waste landfill offers greater protection of human health and the environment than does disposal of the debris in a nonhazardous waste landfill. If the debris is nonhazardous, this alternative is overprotective.

# 6.10.2.2 Compliance with ARARs

This alternative complies with action- and location-specific ARARs. ARARs regarding to hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

# 6.10.2.3 Long-Term Effectiveness and Permanence

The disposal of the structured debris in an on-post hazardous waste landfill results in low residual risk.

#### 6.10.2.4 Reduction of TMV

Since there is no treatment involved in this alternative, there is no reduction in contaminant toxicity or volume; contaminant mobility, however, is minimized by containment in the landfill. There are no treatment residuals.

#### 6.10.2.5 Short-Term Effectiveness

Section 6.3.2.5 describes the short-term effectiveness of this alternative. RAOs are achieved in 1 to 5 years.

# 6.10.2.6 Implementability

This alternative is technically and administratively feasible, with materials and services readily available.

#### 6.10.2.7 Cost

The cost of Alternative 19 includes transportation to the landfill as well as long-term monitoring and maintenance of the landfill. There are 365 structures that can be addressed under this alternative. The present worth cost for this alternative is \$72,700,000.

# 6.11 ALTERNATIVE 20: DISMANTLING, SALVAGE, OFF-POST HAZARDOUS WASTE LANDFILL

# 6.11.1 Description of Alternative

Alternative 20 includes dismantling the structure, salvaging decontaminated scrap metal, transporting the debris to an off-post hazardous waste landfill, and backfilling the structure excavation. This alternative is similar to Alternative 19 (Section 6.10), except that the disposal occurs off post.

#### 6.11.2 Analysis of Alternative

# 6.11.2.1 Overall Protection of Human Health and the Environment

The disposal of the structural debris in an off-post hazardous waste landfill is protective of human health and the environment. Off-post disposal does not allow direct control of long-term monitoring and maintenance, which, compared to on-post disposal, lessens overall protectiveness.

# 6.11.2.2 Compliance with ARARs

Alternative 20 complies with action- and location-specific ARARs. ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

# 6.11.2.3 Long-Term Effectiveness and Permanence

Disposing debris in an off-post hazardous waste landfill results in low residual risk, although the long-term effectiveness and permanence of this alternative may be questionable since there is lack of control over long-term monitoring and maintenance of the landfill. Since the disposal of debris occurs off post, wildlife habitat is improved at the site.

#### 6.11.2.4 Reduction of TMV

Since there is no treatment of the structural debris, this alternative is ineffective in reducing toxicity or volume; contaminant mobility, however, is minimized by containment. There are no treatment residuals.

# 6.11.2.5 Short-Term Effectiveness

Off-post transportation of the debris increases the potential for environmental impacts to the community. RAOs are achieved in 1 to 3 years.

## 6.11.2.6 Implementability

This alternative is technically and administratively feasible, with materials and services readily available, although administrative feasibility is reduced because of concerns regarding the long-term liability of the waste landfilled off post.

#### 6.11.2.7 Cost

The cost of Alternative 20 includes transportation to the off-post landfill as well as long-term monitoring and maintenance. There are 365 structures that can be addressed under this alternative. The present worth cost for this alternative is \$80,100,000.

#### 6.12 ALTERNATIVE 21: DISMANTLING, SALVAGE, CLAY CAP

#### 6.12.1 Description of Alternative

Alternative 21 includes dismantling the structure, salvaging decontaminated scrap metal, and capping the debris in place. Capping is discussed in the Technology Description Volume, Section 6.

The sizing requirements for the cap are similar to those for a landfill. Once the debris is placed into the capping area, fill is used to raise the level of the debris pile so that surface water runoff is directed as desired. The cap covers an area 30 percent larger than the extent of the debris pile. Since many of the structures are located in proximity to each other, it is not practical to place individual caps over each structure, nor is it practical to cap single outlying structures. Therefore, outlying structures are consolidated into areas of high structure density and groups of structures are contained by a single cap where applicable. For Alternative 21 it was assumed that there are three capped areas: South Plants, North Plants, and the Railyard.

All of the structures in and around South Plants are placed in the central process area cap in conjunction with the overall containment alternative for the soils South Plants Medium Group. All structures in and around North Plants region are consolidated into a single capped area within North Plants. All structures in and around the Railyard region are placed in a single capped area within the Railyard. This approach minimizes the amount of capped area that is necessary to monitor and maintain and is consistent with the alternatives chosen for the soils medium. The North Plants and Railyard caps will be revegitated as part of the structures remediation.

#### 6.12.2 Analysis of Alternative

#### 6.12.2.1 Overall Protection of Human Health and the Environment

Alternative 21 is protective of human health and the environment through the isolation and containment of debris by capping.

# 6.12.2.2 Compliance with ARARs

Alternative 21 complies with action- and location-specific ARARs. ARARs regarding caps/covers are presented in the Technology Description Volume, Appendix A, Table A-5.

# 6.12.2.3 Long-Term Effectiveness and Permanence

Alternative 21 results in low residual risk, with structure debris contained by capping. Adequate controls are ensured by long-term monitoring and maintenance of the cap. Wildlife habitat is

both improved and limited under this alternative: it is improved because structures are removed and is limited because caps are emplaced and burrowing animals are excluded.

#### 6.12.2.4 Reduction of TMV

This alternative is effective in reducing contaminant mobility through containment, but is ineffective in reducing toxicity and volume. However, contaminant mobility may change should the cap leak. Contaminated structures are isolated by the cap. There are no treatment residuals associated with this alternative. This alternative does require long-term maintenance and monitoring, thereby increasing overall costs.

#### 6.12.2.5 Short-Term Effectiveness

Section 6.3.2.5 describes the short-term effectiveness of the alternative.

## 6.12.2.6 Implementability

The alternative is technically and administratively feasible. Materials and services are readily available.

#### 6.12.2.7 Cost

There are 365 structures that can be addressed under this alternative. The present worth cost for this alternative is \$35,500,000.

#### 6.13 ALTERNATIVE 21a: DISMANTLING, SALVAGE, CONSOLIDATION

#### 6.13.1 Description of Alternative

Alternative 21a includes dismantling the structure, salvaging decontaminated scrap metal, transporting and consolidating the debris in Basin A and backfilling the structure excavation. Consolidation refers to using the structural debris as fill in an area such as Basin A where alternatives developed for the soils medium are used to fill and cap the area. This can be an effective use of the structural debris since the amount of fill necessary in any of the soils capping

areas far exceeds the volume of structural material. Consolidation is discussed in the Technology Description Volume, Section 6.

# 6.13.2 Analysis of Alternative

#### 6.13.2.1 Overall Protection of Human Health and the Environment

Consolidation of the structures is protective of human health and the environment.

# 6.13.2.2 Compliance with ARARs

The alternative complies with action- and location-specific ARARs. ARARs regarding caps/covers and consolidation are presented in the Technology Description Volume, Appendix A, Table A-5.

# 6.13.2.3 Long-Term Effectiveness and Permanence

The alternative has low residual risk since the structural debris is consolidated and capped in Basin A. Adequate controls are ensured with long-term monitoring and maintenance.

#### 6.13.2.4 Reduction of TMV

Containment of the debris by consolidation reduces contaminant mobility, but toxicity and volume remain unchanged. There are no treatment residuals.

#### 6.13.2.5 Short-Term Effectiveness

Section 6.3.2.5 describes the short-term effectiveness of the alternative. RAOs are achieved in 1 to 3 years.

# 6.13.2.6 Implementability

This alternative is technically and administratively feasible, with materials and services readily available.

# 6.13.2.7 Cost

The cost of this alternative includes transportation to Basin A as well as long-term monitoring and maintenance of the area. There are 365 structures amenable to this alternative. The present worth cost for this alternative is \$30,900,000.

Table 6.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Process History Subgroup

Page 1 of 6

Criteria		ALT. 1: No Action	ALT. 2: Pipe Plugs, Locks/Boards/Fences/Signs	
1.	Overall protection of human health and environment	Does not provide any increase in protectiveness.	Limited protectiveness, eliminates contact with contaminants by preventing access to structure.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidances	Action-specific ARARs do not apply since no action is taken. Complies with location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanence -Magnitude of residual risks -Adequacy and reliability of controls -Habitat impacts	Does not provide any increase in long-term effectiveness or permanence. Residual risk increases with time as structures deteriorate. Current access controls are inadequate for the long term. Habitat remains unchanged.	Moderate residual risk, contaminants are sealed inside pipes, and access to structure is prevented. Adequate controls, long-term monitoring and maintenance required.  Habitat not improved.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV reduction -Irreversibility of TMV reduction	Does not reduce TMV.	Pipe plugging reduces mobility, but may be reversible if pipe plugs fail. Volume of waste is increased. Restricting access reduces mobility.	
	-Type and quantity of treatment residuals		There are no treatment residuals for this alternative.	
5.	Short-term effectiveness -Protection of workers during remedial action -Protection of community during	No worker or community protection is necessary because no action is taken. Does not achieve RAOs.	Worker protection necessary during pipe plugging and access restriction operations.	
remedial action	· -		No additional impacts to habitat.	
	actions -Time until RAOs are achieved		RAOs are attained within 1 year.	
6.	• •	Not administratively feasible because	Technically and administratively feasible.	
	-Technical feasibility -Administrative feasibility -Availability of services and materials	further structure deterioration may pose a physical and chemical hazard.	Services and materials are readily available	
7.	Cost <sup>1</sup>	60.00	***	
	-Present worth cost	\$0.00	\$38,300,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

RAO Remedial Action Objective TMV Toxicity, Mobility, or Volume

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4.

Table 6.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group - Process History Subgroup

Page 2 of 6

Criteria		ALT. 8: Hot Gas, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill	ALT. 9: Vacuum Dusting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, treatment limited to organics on nonflammable surfaces. Debris contained by landfilling.	Protective, treatment only applicable to removing contaminated dust.	
2.	Compliance with ARARs  -Action-specific ARARs  -Location-specific ARARs  -Criteria, advisories, and guidances	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanenceMagnitude of residual risksAdequacy and reliability of	Low residual risk, for structures with surface organic contamination on nonflammable surfaces only.	Low residual risk for structures with dust contamination only.	
	controls -Habitat impacts	Adequate controls for structural debris that can be placed in a nonhazardous waste landfill. Long-term maintenance required.	Adequate controls for structural debris that can be placed in a nonhazardous waste landfill. Long-term maintenance required.	
		Habitat improved at site, but limited at landfill.	Habitat improved at site, but limited at landfill.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV	Hot gas irreversibly reduces TMV of organics on nonflammable surfaces.  Off gases are produced and treated by carbon adsorption.	Vacuum dusting irreversibly reduces contaminant mobility of surfaces contaminated with dusts.	
	reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Landfilling reduces mobility, but may be reversible if landfill leaks.	Treatment residuals consist of contaminated dusts.	
5.	Short-term effectiveness -Protection of workers during remedial action -Protection of community during remedial action	Worker exposure controls necessary during hot gas treatment a concern, toxic off gases produced. Dust controls needed for demolition.	Worker exposure controls required during vacuuming. Dust controls needed for demolition.	
	-Environmental impacts of remedial	Positive habitat impacts at site.	Habitat improved at site.	
	actions -Time until RAOs are achieved	RAOs are achieved within 1 to 3 years.	RAOs are achieved within 1 to 3 years.	
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and materials	Limited to organics on nonflammable surfaces. May compromise structural integrity. Isolation of treatment area difficult. Administratively feasible.	Treatment limited to dust contamination only. Administratively and technically feasible.	
	macriais	Hot gas services and expertise limited.	Materials and services readily available.	
7.	Cost <sup>1</sup>			
	-Present worth cost	\$119,000,000	\$49,700,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

RAO Remedial Action Objective
TMV Toxicity, Mobility, or Volume

Cost does not include ongoing activities described in Secion 2.2.3 and listed in Table 9.4-4.

Table 6.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Process History Subgroup

Page 3 of 6

	The second secon			
Criteria		ALT. 9a: Steam Cleaning, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill	ALT. 10: Sand Blasting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, treatment limited to contamination on nonporous surfaces.	Protective, treatment limited to surface contaminants.	
2.	Compliance with ARARs  -Action-specific ARARs  -Location-specific ARARs  -Criteria, advisories, and guidances	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanence  -Magnitude of residual risks  -Adequacy and reliability of	Low residual risk for structures with contamination on nonporous surfaces only.	Low residual risk for structures with surface contamination only.	
	controls  -Habitat impacts	Adequate controls for structural debris that can be placed in a nonhazardous landfill. Long-term maintenance required.	Adequate controls for structural debris that can be placed in a nonhazardous waste landfill. Sand blasting satisfies BDAT for contaminated structural material. Long-term maintenance is required.	
		Habitat improved at site, but limited at landfill.	Habitat improved at site, but limited at landfill.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated	Steam cleaning irreversibly reduces rnobility and volume of contaminants on non-porous surfaces.	Sand blasting irreversibly reduces the mobility and volume of surface contamination. Treatment is not applicable to wood.	
	-Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Treatment residuals consist of contaminated washwater.	The treatment residuals consist of contaminated grit.	
5.	Short-term effectiveness -Protection of workers during remedial action -Protection of community during	Worker exposure controls during steam cleaning. Dust controls needed for demolition.	Worker exposure controls during sand blasting. Dust controls needed for demolition.	
	remedial action -Environmental impacts of remedial actions	Habitat improved at site.	Habitat is improved at the site.	
	-Time until RAOs are achieved	RAOs are achieved within 1 to 3 years.	RAOs are attained within 1 to 3 years.	
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and	Treatment limited to contaminants on nonporous surfaces. Administratively feasible.	Treatment limited to surface contaminants, not applicable to wood surfaces.  Administratively feasible.	
	materials	Materials and services readily available.	Materials and services readily available.	
7.	Cost <sup>1</sup> -Present worth cost	\$50,300,000	\$51,900,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

RAO Remedial Action Objective TMV Toxicity, Mobility, or Volume

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4.

Table 6.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Process History Subgroup

Page 4 of 6

Cri	teria	ALT. 12: Dismantling, Salvage, Off-Post Rotary Kiln Incineration, Off-Post Hazardous Waste Landfill	ALT. 13: Dismantling, Salvage, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, debris treated by incineration and contained by landfilling.	Protective, debris treated by incineration and contained by landfilling.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidances	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanenceMagnitude of residual risksAdequacy and reliability of controls	Low residual risk, structural debris treated by incineration and contained by landfilling. Adequate controls for landfilled structural debris.	Low residual risk, incinerated debris nonhazardous. Adequate controls, long-term maintenance required.	
	-Habitat impacts	Habitat improved at site.	Habitat improved at site, but limited at landfill.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Incineration irreversibly reduces TMV. Treatment produces off gases. Landfill reduces mobility, but may be reversible if landfill leaks.	Incineration irreversibly reduces TMV, renders debris nonhazardous. Off gases are produced.	
5.	Short-term effectiveness  -Protection of workers during remedial action  -Protection of community during	Dust controls needed during demolition.  Habitat improved at site.	Dust controls needed for demolition. Air controls needed for incineration. Habitat improved at site.	
	remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	RAOs are attained within 1 to 3 years.	RAOs are achieved in 1 to 5 years.	
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and	Technically feasible. Administratively feasible, but long-term liability issues a concern with off-post disposal.	Technically and administratively feasible.	
	materials	Materials and services readily available.	Materials and services are readily available.	
7.	Cost <sup>1</sup> -Present worth cost	<b>\$</b> 528,000,000	\$95,800,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

RAO Remedial Action Objective TMV Toxicity, Mobility, or Volume

Cost does not include ongoing activities described in Secion 2.2.3 and listed in Table 9.4-4.

Table 6.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Process History Subgroup

Page 5 of 6

Criteria		ALT. 19: Dismantling, Salvage, On-Post Hazardous Waste Landfill	ALT. 20: Dismantling, Salvage, Off-Post Hazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, debris is contained by landfilling.	Protective, debris contained by landfilling.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidances	Complies with action- and location-specific ARARs.	Complies with action- and location- specific ARARs.	
3.	Long-term effectiveness and permanence -Magnitude of residual risks -Adequacy and reliability of	Low residual risk, structural debris is contained by landfilling. Adequate controls, long-term monitoring required.	Low residual risk, structural debris contained by landfilling. Adequate controls for landfilled debris.	
	controls -Habitat impacts	Habitat improved at site, but limited at landfill.	Habitat improved at site.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Landfilling reduces mobility. Mobility reduction may be reversed if landfill leaks.	Landfilling reduces mobility. Mobility reduction may be reversible if landfill leaks.	
		No treatment residuals.	No treatment residuals.	
5.	Short-term effectiveness -Protection of workers during remedial action	Dust controls needed for demolition.  Habitat improved at site.	Dust controls needed for demolition.	
	-Protection of community during remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	RAOs are achieved in 1 to 5 years.	RAOs achieved in 1 to 3 years.	
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and	Technically and administratively feasible.	Technically and administratively feasib but long-term liability a concern for of post disposal.	
	materials	Materials and services readily available.	Materials and services readily available	
7.	Cost <sup>1</sup> -Present worth cost	\$72,700,000	\$80,100,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

RAO Remedial Action Objective TMV Toxicity, Mobility, or Volume

Cost does not include ongoing activities described in Secion 2.2.3 and listed in Table 9.4-4.

Table 6.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Process History Subgroup

Page 6 of 6

Criteria		ALT. 21: Dismantling, Salvage, Clay Cap	ALT. 21a: Dismantling, Salvage, Consolidation	
1.	Overall protection of human health and environment	Protective, debris contained by capping.	Protective, debris contained through consolidation.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidances	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanenceMagnitude of residual risksAdequacy and reliability of controlsHabitat impacts	Low residual risk, structural debris contained by capping. Adequate controls, long-term maintenance and monitoring of caps required.  Habitat improved, but restriction needed for burrowing animals.	Low residual risk, structural debris consolidated and capped in Basin A or other suitable area. Adequate controls, long-term maintenance and monitoring required. Habitat improved, but restrictions needed for burrowing animals.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated	Capping reduces mobility, but may be reversible if cap leaks.	Consolidation reduces mobility.  Mobility reduction may be reversible if cap leaks.	
	-Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	No treatment residuals.	No treatment residuals.	
5.	Short-term effectiveness  -Protection of workers during remedial action	Dust controls needed for demolition.	Dust controls needed for demolition.	
	-Protection of community	Habitat improved at site.	Habitat improved at site.	
	during remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	RAOs achieved in 1 to 3 years.	RAOs achieved in 1 to 3 years.	
6.	Implementability  -Technical feasibility	Technically and administratively feasible.	Technically and administratively feasible.	
	<ul> <li>Administrative feasibility</li> <li>Availability of services and materials</li> </ul>	Materials and services readily available.	Materials and services readily available	
7.	Cost <sup>1</sup> -Present worth cost	\$35,500,000	\$30,900,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

RAO Remedial Action Objective TMV Toxicity, Mobility, or Volume

Cost does not include ongoing activities described in Secion 2.2.3 and listed in Table 9.4-4.

# 7.0 NO FUTURE USE, MANUFACTURING HISTORY-NON-PROCESS HISTORY SUBGROUP

Structures in the No Future Use, Manufacturing History-Non-Process History Subgroup include those structures that have administrative, utility, or support use histories, and are collocated with process history structures. No action, containment, and disposal options are considered among the general response actions applicable to this subgroup. Each alternative was described and analyzed according to the seven EPA evaluation criteria (see the Executive Summary). The alternatives applicable to this subgroup are a subset of the alternatives applicable to the Process History Subgroup, which are described in Section 6. These alternatives do not include any treatment options since the use histories of the structures indicate a low probability of contamination. Refer to Section 6.3 for the general alternative description and analysis, and to Table 7.0-1 for the comparative analysis in tabular format. Sampling for this subgroup is described in Section 2.4.

As with the Process History Subgroup, action-specific ARARs that apply to all alternatives in the Non-Process History Subgroup (with the exception of Alternative 1, No Action) include those regarding demolition of structures (Technology Description Volume, Appendix A, Table A-3), conventional excavation and backfill (Technology Description Volume, Appendix A, Table A-1), and transportation of wastes (Technology Description Volume, Appendix A, Table A-34). ARARs regarding demolition address worker protection, wildlife protection, noise control, and air emission control. The ARARs regarding stockpiling address waste characterization and management, wildlife protection, and worker protection. ARARs regarding excavation and backfill address worker protection, protection of wildlife, noise abatement, air emission control, waste characterization and management, and groundwater injection. ARARs regarding transportation of waste address transportation of hazardous wastes, both on and off post. All alternatives (with the exception of the No Action alternative) are in compliance with these actionspecific ARARs, as well as location-specific ARARs, which are included in the Structures DSA, Technology Description Volume, Appendix A, Table 2A. Unique action-specific ARARs that apply to individual alternatives within the subgroup are described below.

#### 7.1 ALTERNATIVE 1: NO ACTION

## 7.1.1 <u>Description of Alternative</u>

The No Action alternative involves no further action beyond existing measures. No action is applicable to the Non-Process History Subgroup because the use histories of the structures in this subgroup indicate a low probability of contamination. However, some structures in this subgroup may need to be removed to accomplish remediation of the underlying soils.

# 7.1.2 Analysis of Alternative

#### 7.1.2.1 Overall Protection of Human Health and the Environment

This alternative is protective of human health and the environment to the extent that the structures in this subgroup do not contain any chemical contamination. However, physical hazards related to deterioration of the structures increase with time.

# 7.1.2.2 Compliance with ARARs

There are no action- or location-specific ARARs applicable to Alternative 1.

# 7.1.2.3 Long-Term Effectiveness and Permanence

Alternative 1 does not provide any long-term effectiveness or permanence.

#### 7.1.2.4 Reduction of TMV

Alternative 1 does not reduce TMV.

#### 7.1.2.5 Short-Term Effectiveness

Since there is no action taken, no worker or community protection is necessary, nor are there environmental impacts associated with this alternative.

## 7.1.2.6 Implementability

This alternative is technically implementable. It is not administratively feasible, however, because further deterioration of the structures may pose a physical hazard.

## 7.1.2.7 Cost

The cost of Alternative 1 is \$0.00.

# 7.2 ALTERNATIVE 2a: LOCKS/BOARDS/FENCES/SIGNS

# 7.2.1 <u>Description of Alternative</u>

Structures Alternative 2a is very similar to Alternative 2 (Section 6.2) except that it does not include pipe plugging, which is not applicable to this subgroup. Alternative 2a uses a combination of locks, boards, fences, and signs to prevent access to the structure. Locks, boards, fences, and signs are described in the Technology Description Document, Section 3.

Before Alternative 2a can be implemented, each structure in the subgroup must be visually examined. An interior and exterior examination is performed to determine the structural integrity of the building. If any of the structures are found to be unsafe for the implementation of Alternative 2a, the structures are repaired to ensure the safety of workers in and around the structures. The necessary repairs for many of the structures in this subgroup may represent a significant effort. It was assumed that there is no ACM associated with these structures at the time of remediation since the scope of the Asbestos IRA, currently in progress, is to remove all ACM from structures.

Locks, boards, fences, and signs are installed as appropriate to prevent access to the structure. Due to the unique configuration and differing accessibility of structures in this subgroup, the types and quantities of locks, boards, fences, or signs are evaluated separately for each structure.

Since Alternative 2a is a containment option, the structures remain intact indefinitely; therefore, inspections and repairs are performed on a regular basis as part of this alternative.

# 7.2.2 Analysis of Alternative

#### 7.2.2.1 Overall Protection of Human Health and the Environment

This alternative is protective of human health and the environment by preventing access to a structure. Since this subgroup is not expected to be contaminated, access prevention is sufficient for protection.

#### 7.2.2.2 Compliance with ARARs

This alternative complies with applicable action- and location-specific ARARs. Applicable action-specific ARARs related to this alternative include institutional controls (Technology Description Document, Appendix A, Table A-35). ARARs regarding institutional controls address access restrictions, land use/deed restrictions, and monitoring. The location-specific ARARs applicable to this alternative are included in the Structures DSA, Technology Description Volume, Appendix A, Table 2A.

### 7.2.2.3 Long-Term Effectiveness and Permanence

There is low residual risk associated with this alternative since the structures in this subgroup have no history of contamination, although there is a need for preventive maintenance and long-term monitoring for an indefinite period of time. The long-term effectiveness and permanence of this alternative is therefore questionable. This alternative protects wildlife by preventing contact with potential contamination, but the habitat remains unchanged and may actually be reduced for species that used the structures as part of their habitat. However, some burrowing or invasive species (e.g., rodents, insects) may eventually regain access to the structure and re-establish their habitat.

#### 7.2.2.4 Reduction of TMV

The use of locks, boards, fences, and signs to prevent access is effective in reducing the mobility of contaminants; however, it does not reduce volume or toxicity. Because there is no contamination expected to be associated with these structures, however, TMV reduction is not necessary. The alternative produces no treatment residuals.

#### 7.2.2.5 Short-Term Effectiveness

Worker protection is necessary during isolation operations. There are no environmental impacts to the community from this remedial action. RAOs are achieved within 1 year.

# 7.2.2.6 Implementability

This alternative is both administratively and technically implementable, with services and materials readily available. Services and materials for structural repair as well as for the locks, boards, fences, and signs are readily available.

#### 7.2.2.7 Cost

The cost of Alternative 2a includes annual ambient air monitoring of the structure and is based on the assumption that the structure makes use of a dedicated high-volume air sampler. Alternative 2a is applicable to 423 structures in the Non-Process History Subgroup. The present worth cost of Alternative 2a is approximately \$8,630,000. These costs include monitoring and long-term maintenance for a 30-year period, after which time the need for maintenance and monitoring is re-evaluated. It is anticipated that maintenance and monitoring continue past the 30-year period at an approximate annual cost of \$338,000.

# 7.3 ALTERNATIVE 19a: DISMANTLING, SALVAGE, ON-POST NONHAZARDOUS WASTE LANDFILL

## 7.3.1 <u>Description of Alternative</u>

Alternative 19a includes dismantling the structure, salvaging the metal from the debris, transporting the debris to an on-post nonhazardous waste landfill, and backfilling the structure excavation.

# 7.3.2 Analysis of Alternative

#### 7.3.2.1 Overall Protection of Human Health and the Environment

Containing structural debris by placing it in an on-post nonhazardous waste landfill is protective of human health and the environment since the debris from structures in this subgroup is expected to be nonhazardous.

# 7.3.2.2 Compliance with ARARs

Alternative 19a complies with action- and location-specific ARARs. ARARs regarding nonhazardous waste landfills are described in the Technology Description Document, Appendix A, Table A-8.

# 7.3.2.3 Long-Term Effectiveness and Permanence

The disposal of structural debris in an on-post nonhazardous waste landfill results in low residual risk since no contamination is expected to be associated with these structures. There are no treatment residuals associated with this alternative. Adequate controls require long-term monitoring and maintenance of the landfill. Wildlife habitat is limited at the landfill.

#### 7.3.2.4 Reduction of TMV

Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable. There are no treatment residuals.

#### 7.3.2.5 Short-Term Effectiveness

Section 6.3.2.5 describes the short-term effectiveness of this alternative. RAOs are achieved in 1 to 5 years.

# 7.3.2.6 Implementability

Alternative 19a is technically and administratively feasible, with materials and services readily available. Salvage options for the Non-Process History Subgroup are unlimited because no contamination is expected to be associated with the structures.

#### 7.3.2.7 Cost

The cost of Alternative 19a includes transportation to the landfill as well as long-term monitoring and maintenance of the landfill. The 423 structures in this subgroup can be addressed by this alternative. The present worth cost for this alternative is \$13,900,000.

# 7.4 ALTERNATIVE 20a: DISMANTLING, SALVAGE, OFF-POST NONHAZARDOUS WASTE LANDFILL

## 7.4.1 Description of Alternative

Alternative 20a includes dismantling the structure, salvaging the metal from the debris, transporting the debris to an off-post nonhazardous waste landfill, and backfilling the structure excavation. This alternative is very similar to Alternative 19a, except that the disposal is off post.

#### 7.4.2 Analysis of Alternative

# 7.4.2.1 Overall Protection of Human Health and the Environment

Containing structural debris by placing it in an off-post nonhazardous waste landfill is protective of human health and the environment since the debris in this subgroup is expected to be nonhazardous.

#### 7.4.2.2 Compliance with ARARs

Alternative 20a complies with action- and location-specific ARARs. ARARs regarding nonhazardous waste landfills are described in the Technology Description Document, Appendix A, Table A-8.

# 7.4.2.3 Long-Term Effectiveness and Permanence

The disposal of structural debris in an off-post nonhazardous waste landfill results in low residual risk since no contamination is expected to be associated with these structures. There are no treatment residuals associated with this alternative. Adequate controls require long-term

monitoring and maintenance of the landfill. Since disposal of the debris is off post, wildlife habitat is improved throughout the site.

#### 7.4.2.4 Reduction of TMV

Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable. There are no treatment residuals.

#### 7.4.2.5 Short-Term Effectiveness

Off-post transportation of the structural debris increases the potential for environmental impacts to the community associated with this alternative. RAOs are achieved in 1 to 3 years.

# 7.4.2.6 Implementability

Alternative 20a is technically and administratively feasible, with materials and services readily available. Salvage options for the Non-Process History Subgroup are unlimited because no contamination is expected to be associated with the structures.

### 7.4.2.7 Cost

The cost of Alternative 20a includes transportation to the landfill. The 423 structures in this subgroup can be addressed by this alternative. The present worth cost for this alternative is \$13,100,000.

# 7.5 ALTERNATIVE 21: DISMANTLING, SALVAGE, CLAY CAP

# 7.5.1 Description of Alternative

Alternative 21 includes dismantling the structure, salvaging the metal from the debris, and capping the debris in a local collection point. Capping is described in the Technology Description Document, Section 6, and a detailed description of this alternative is provided in Section 6.12.

# 7.5.2 Analysis of Alternative

#### 7.5.2.1 Overall Protection of Human Health and the Environment

Alternative 21 is protective of human health and the environment through the isolation and containment of debris by capping.

# 7.5.2.2 Compliance with ARARs

The alternative complies with action- and location-specific ARARs. ARARs regarding caps/covers are described in the Technology Description Document, Appendix A, Table A-5.

# 7.5.2.3 Long-Term Effectiveness and Permanence

Alternative 21 results in low residual risk, with structural debris contained by capping. This alternative requires long-term maintenance and monitoring of the clay caps to ensure adequate controls are maintained. Wildlife habitat is limited in the vicinity of each of the caps.

#### 7.5.2.4 Reduction of TMV

Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable. However, should there be any contamination in the structural debris, its mobility is removed by containment. There are no treatment residuals.

#### 7.5.2.5 Short-Term Effectiveness

Section 6.3.2.5 describes the short-term effectiveness of this alternative. RAOs are achieved in 1 to 5 years.

### 7.5.2.6 Implementability

The alternative is technically and administratively feasible. Materials and services are readily available.

### 7.5.2.7 Cost

There are 423 structures in this subgroup that are amenable to this alternative. The present worth cost for this alternative is \$13,600,000.

# 7.6 ALTERNATIVE 21a: DISMANTLING, SALVAGE, CONSOLIDATION

# 7.6.1 <u>Description of Alternative</u>

Alternative 21a includes dismantling the structure, salvaging the metal materials from the debris, transporting and consolidating the debris in Basin A, and backfilling the structure excavation. Consolidation is described in the Technology Description Document, Section 6. The detailed description of this alternative is provided in Section 6.13.

## 7.6.2 Analysis of Alternative

## 7.6.2.1 Overall Protection of Human Health and the Environment

Consolidation of the structural debris is protective of human health and the environment since the debris is contained and is expected to be nonhazardous.

## 7.6.2.2 Compliance with ARARs

Alternative 21a complies with action- and location-specific ARARs. ARARs regarding caps/covers and consolidation are described in the Technology Description Document, Appendix A, Table A-5.

## 7.6.2.3 Long-Term Effectiveness and Permanence

On-site consolidation of the nonhazardous debris in Basin A results in low residual risk. Adequate controls require long-term monitoring and maintenance of the consolidation area.

#### 7.6.2.4 Reduction of TMV

Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable. However, should there be any contamination in the structural debris, its mobility is eliminated by containment. There are no treatment residuals.

# 7.6.2.5 Short-Term Effectiveness

Section 6.3.2.5 describes the short-term effectiveness of this alternative. RAOs are achieved in 1 to 5 years.

# 7.6.2.6 Implementability

This alternative is technically and administratively feasible, with materials and services readily available. Metal salvage options for the Non-Process History Subgroup are unlimited because no contamination is expected to be associated with the structures.

#### 7.6.2.7 Cost

The cost of this alternative includes transportation to Basin A as well as long-term monitoring and maintenance of the area. There are 423 structures in this subgroup that are amenable to this alternative. The present worth cost for this alternative is \$10,600,000.

Table 7.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Non-Process History Subgroup

Page 1 of 3

Criteria		ALT. 1: No Action	ALT. 2a: Locks/Boards/Fences/Signs
1.	Overall protection of human health and environment	Not protective of physical hazards.	Protective, eliminates contact by preventing access to structure.
2.	Compliance with ARARs  -Action-specific ARARs  -Location-specific ARARs  -Criteria, advisories, and guidances	There are no action- or location- specific ARARs for this medium subgroup.	Complies with action- and location-specific ARARs.
3.	Long-term effectiveness and permanence -Magnitude of residual risks -Adequacy and reliability of controls -Habitat impacts	Does not provide long-term effectiveness or permanence.	Low residual risk, access to structure prevented. Adequate controls, long-term structure maintenance and monitoring required.  Habitat not improved.
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Does not reduce TMV.	Access restrictions reduce mobility.  No treatment residuals.
5.	Short-term effectiveness -Protection of workers during remedial action -Protection of community during remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	No worker or community protection is necessary, no environmental impacts.	Standard worker protection for isolation operations.  Habitat unchanged.  RAOs are achieved in 1 year.
6.	Implementability  -Technical feasibility  -Administrative feasibility  -Availability of services and materials	Technically feasible. Not administratively feasible because further deterioration of structures may pose a physical hazard.	Technically and administratively feasible.  Materials and services readily available
<b>7</b> .	Cost <sup>1</sup> -Present worth cost	\$0.00	\$8,630,000

ARARs Applicable or Relevant and Appropriate Requirements

TMV Toxicity, Mobility, or Volume

CY Cubic Yards

RAO Remedial Action Objective

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

Table 7.0-1 Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group – Non-Process History Subgroup

Page 2 of 3

Criteria		ALT. 19a: Dismantling, Salvage, On-Post Nonhazardous Waste Landfill	ALT. 20a: Dismantling, Salvage, Off-Post Nonhazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, debris contained by landfilling.	Protective, debris contained by landfilling.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidances	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanence  -Magnitude of residual risks  -Adequacy and reliability of controls	Low residual risk, structural debris contained by landfilling. Adequate controls, long-term monitoring required.	Low residual risk, structural debris contained by landfilling.	
	-Habitat impacts	Habitat improved at site, but limited at landfill.	Habitat improved at site.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV	Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable	Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable	
	reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	No treatment residuals.	No treatment residuals.	
5.	Short-term effectiveness  -Protection of workers during remedial action	Dust controls needed for demolition.	Dust controls needed for demolition.	
	-Protection of community	Habitat improved at site.	Habitat improved at site.	
	during remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	RAOs are achieved in 1 to 5 years.	RAOs are achieved in 1 to 3 years.	
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and materials	Technically and administratively feasible; disposal in a hazardous waste landfill not required by ARARs.	Technically and administratively feasible. Long-term liability a concert for off-post disposal. Hazardous waste disposal not required by ARARs.	
	***************************************	Materials and services readily available.	Materials and services readily available	
7.	Cost <sup>1</sup>		*** *** ***	
	-Present worth cost	\$13,900,000	\$13,100,000	

ARARs Applicable or Relevant and Appropriate Requirements

TMV Toxicity, Mobility, or Volume

CY Cubic Yards

RAO Remedial Action Objective

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

Table 7.0-1: Comparative Analysis of Alternatives, No Future Use, Manufacturing History Medium Group
- Non-Process History Subgroup
Page 3 of 3

Criteria		ALT. 21: Dismantling, Salvage, Clay Cap	ALT. 21a: Dismantling, Salvage, Consolidation	
I. Overall protect health and envi		Protective, achieves RAOs by containment.	Protective, achieves RAOs through consolidation and containment.	
<ol> <li>Compliance wi         <ul> <li>Action-specifi</li> <li>Location-spec</li> <li>Criteria, advis guidances</li> </ul> </li> </ol>	c ARARs ific ARARs	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3. Long-term effe permanence -Magnitude of -Adequacy and controls -Habitat impac	residual risks I reliability of	Low residual risk, structural debris contained by capping. Adequate controls, long-term maintenance and monitoring of caps required.	Low residual risk, structural debris consolidated and capped in Basin A or other suitable area. Adequate controls, long-term maintenance and monitoring of capped area required.	
		Habitat improved, but need restrictions for burrowing animals.	Habitat improved, but restrictions for burrowing animals.	
<ol> <li>Reduction in T treatment</li></ol>	ocess used and	Since no contaminants are expected to be associated with this subgroup, reduction in TMV is not applicable	Since no contaminants are expected to be associated with this subgroup, reduction n TMV is not applicable	
<ul><li>Degree and question</li><li>Irreversibility</li><li>reduction</li></ul>	uantity of TMV	No treatment residuals.	No treatment residuals.	
5. Short-term effe -Protection of remedial action	workers during	Dust controls needed for demolition.	Dust controls needed during demolition.	
-Protection of during remedia -Environmenta	community l action	Habitat improved at site.	Habitat improved at site, limited at capped area.	
remedial action		RAOs are achieved in 1 to 5 years.	RAOs are achieved in 1 to 5 years.	
6. Implementabili -Technical fea -Administrativ	sibility	Technically and administratively feasible. Materials and services readily available.	Technically and administratively feasible.	
-Administrative -Availability of materials		icadily available.	Materials and services readily available.	
7. Cost <sup>1</sup> -Present worth	cost	\$13,600,000	\$10,600,000	

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

ARARs Applicable or Relevant and Appropriate Requirements

TMV Toxicity, Mobility, or Volume

CY Cubic Yards

RAO Remedial Action Objective

## 8.0 NO FUTURE USE, AGENT HISTORY MEDIUM GROUP

Structures in the No Future Use, Agent History Medium Group include those with a history of producing, processing, testing, storing, or destroying Army chemical agents. Plate 3.0-1 shows the locations of these structures. These structures must be handled in compliance with AR 385-131, and Department of Defense (DOD) regulations in effect at the time of remediation. Action must be taken to treat the agent contamination within the structure or debris to a level consistent with Army regulations (3X or 5X) so it may be properly disposed. Many of the structures in this medium group are covered under chemical weapons treaties as described in Section 3.3.4.

The remedial alternatives developed for this group encompass the range of treatment and disposal options necessary to deal with the wide range of contaminants potentially associated with these structures (Table 8.0-1). Containment or institutional control options, without treatment, are not suitable response actions for the structures in this medium group. Likewise, the technology types of surface cleaning and surface removal are not suitable for this medium group unless the agent-contaminated structural material is chemically treated to 3X standard so the materials can be placed in a hazardous waste landfill. Alternatively, materials thermally treated to the 5X standard can be released from government control. Salvage is not a suitable process option for agent-contaminated structural materials due to potential regulatory and community concerns. The alternatives were analyzed according to the seven EPA evaluation criteria (see the Executive Summary).

All of the alternatives considered for the No Future Use, Agent History Medium Group have demolition and landfilling in common with those developed for the No Future Use, Manufacturing History Medium Group. Refer to Section 6.3 for a general discussion and analysis of these options. Because structures in this medium group are regulated under AR 385–131, there are certain aspects of the remedial alternatives (e.g., air monitoring, worker protection) that are unique to this medium group. In addition, as discussed in Section 6, it was assumed that all ACM is removed from the structures prior to the initiation of the structures remediation under the Asbestos IRA. ACM in this medium group is regulated under AR 385-

131, however, the removal of most of the ACM is expected to be conducted as an integral part of structures remediation. As described in Section 2.2.3, the cost of ACM removal is covered by the Asbestos IRA. It is assumed that all process equipment, piping, and tanks are removed and treated to 3x standard prior to the structures remediation under the chemical-process-related activities.

Before any of the alternatives can be implemented, and before any structural repair is completed, air monitoring of the interior of the structure must be performed to determine whether agent is present. If agent is detected, suitable treatments and worker protection are implemented in accordance with AR 385-131 and visual inspection and demolition is conducted (Section 6.3). After the debris is sized for placement in a hazardous waste landfill, it is confined and the interior air space monitored for the presence of agent. Should agent be detected at or above action levels, additional treatment will be necessary. Debris that passes monitoring standards are elevated to 3X status and transported to the landfill for disposal.

As with the No Future Use, Manufacturing History Medium Group, action-specific ARARs that apply to all alternatives in the No Future Use, Agent History Medium Group (with the exception of Alternative 1, No Action) include those ARARs related to demolition of structures (Technology Description Volume, Appendix A, Table A-3). ARARs regarding demolition address worker protection, wildlife protection, noise control, and air emission control. ARARs regarding stockpiling address waste characterization and management, wildlife protection, and worker protection. All alternatives, with the exception of the No Action alternative, are in compliance with these action-specific ARARs as well as location-specific ARARs, which are listed in the Structures DSA, Volume I, Appendix A, Table 2A. Unique action-specific ARARs that apply to individual alternatives within the medium group are described below.

#### 8.1 ALTERNATIVE 1: NO ACTION

# 8.1.1 <u>Description of Alternative</u>

The No Action alternative is generally not a suitable alternative for this medium group.

## 8.1.2 Analysis of Alternative

## 8.1.2.1 Overall Protection of Human Health and the Environment

Alternative 1 does not provide protection of human health and the environment if agent contamination is present. Structures continue to deteriorate under this alternative.

## 8.1.2.2 Compliance with ARARs

Alternative 1 does not comply with location-specific ARARs. There are no action-specific ARARs for this alternative.

# 8.1.2.3 Long-Term Effectiveness and Permanence

Alternative 1 does not provide long-term effectiveness or permanence.

#### 8.1.2.4 Reduction of TMV

Alternative 1 does not reduce contaminant TMV.

#### 8.1.2.5 Short-Term Effectiveness

Since there is no action taken there are no environmental impacts to the community. RAOs are not achieved.

# 8.1.2.6 Implementability

This alternative is technically and administratively feasible.

#### 8.1.2.7 Cost

The present worth cost of this alternative is \$0.00.

# 8.2 ALTERNATIVE 4: HOT GAS, DISMANTLING, ON-POST HAZARDOUS WASTE LANDFILL

## 8.2.1 Description of Alternative

This alternative includes administering in situ hot gas treatment, dismantling the structure, consolidating the resulting debris in the on-post hazardous waste landfill, and backfilling the structure excavation.

In situ hot gas treatment for structures is limited to nonflammable surfaces (e.g., metals, masonry) where agent production or handling operations occurred, where documented spills occurred, or where air monitoring has detected agent. Hot gas treatment consists of injecting hot gases into a sealed room to thermally desorb contaminants from structural surfaces. The treatment produces a gaseous sidestream in which the entrained contaminants are captured and treated by incineration. Pre-treatment of the structure includes isolating the treatment area and post-treatment includes collecting and treating the off gases produced. Due to the limited applicability of hot gas treatment, some potentially contaminated portions of the structure may not be able amenable to this treatment. Following hot gas treatment, the structure is again monitored for agent prior to dismantling. If agent is still detected, the structure is once again treated before dismantling takes place. Hot gas treatment is described in the Technology Description Volume, Section 8.

# 8.2.2 Analysis of Alternative

#### 8.2.2.1 Overall Protection of Human Health and the Environment

Alternative 4 is protective of human health and the environment, although treatment is limited to organics on nonflammable surfaces. Pilot-scale tests have proven that hot gas is an effective treatment for structures contaminated with Army chemical agent.

#### 8.2.2.2 Compliance with ARARs

The alternative complies with action- and location-specific ARARs. ARARs regarding hot gas decontamination of structures and debris are presented in the Technology Description Volume,

Appendix A, Table A-15, and ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

## 8.2.2.3 Long-Term Effectiveness and Permanence

Alternative 4 has a low residual risk for structures with surficial organic and Army chemical agent contamination on nonflammable surfaces. Hot gas treatment removes Army chemical agent from the surfaces of structures, thereby decreasing the residual risk and enhancing the effectiveness and permanence of the alternative.

#### 8.2.2.4 Reduction of TMV

Hot gas treatment of nonflammable surfaces irreversibly reduces the TMV of organics and Army chemical agent. Treatment residuals include potentially hazardous off gases that must be collected and treated as part of the process.

#### 8.2.2.5 Short-Term Effectiveness

Worker protection controls are instituted during hot gas treatment. Due to the aggressive nature of this treatment and the possibility of liberating Army chemical agent, all off gases must be collected and treated to protect the health and safety of the community. This alternative assumes that all Army chemical agent is effectively treated to the 3X standard. The debris is monitored for Army chemical agent after demolition. If agent is detected, additional treatment will be necessary, which may limit the effectiveness of this alternative. RAOs are achieved within 1 to 5 years.

#### 8.2.2.6 Implementability

There are limits to the technical feasibility of this alternative because isolation of the treatment area is difficult and because hot gas treatment may compromise structural integrity. The ability to seal the structure may limit the effectiveness of hot gas treatment due to heat loss or gas leakage through gaps in the structure. Structural repair to eliminate leakage pathways may be required prior to treatment. In addition, the complexity of the physical configuration of the

structure (i.e., the inaccessibility of corners or recesses) may prevent even heating, and the physical properties of the structure may inhibit the diffusion and release of contaminants to the gas stream (e.g., smooth steel may release contaminants more readily than porous concrete). The alternative is administratively feasible. To date, hot-gas technology has only been developed at the pilot scale, and its effectiveness at full field scale is unknown. It is not a commercially available technology, and technical expertise is limited.

#### 8.2.2.7 Cost

For cost-estimating purposes, it was assumed that dismantling is used to demolish the structure and that only interior surfaces are treated. There are 67 structures amenable to this alternative. The cost of this alternative also includes air monitoring for analytical verification of the effectiveness of the treatment and incineration treatment of the emitted gas. The present worth cost of this alternative is approximately \$181,000,000, including transportation to an on-post hazardous waste landfill.

# 8.3 ALTERNATIVE 6: HOT GAS, DISMANTLING, ON-POST ROTARY KILN INCINERATION, ON-POST NONHAZARDOUS WASTE LANDFILL

## 8.3.1 Description of Alternative

Alternative 6 includes administering in situ hot gas treatment, dismantling the structure, and incinerating the debris in an on-post rotary kiln incinerator, transporting and disposing of the ash in the on-post nonhazardous waste landfill and backfilling the structure excavation. This alternative is similar to Alternative 4 except for the addition of rotary kiln incineration to treat the debris.

#### 8.3.2 Analysis of Alternative

# 8.3.2.1 Overall Protection of Human Health and the Environment

Alternative 6 is protective of human health and the environment through destruction of organic contaminants, including Army chemical agent, through hot gas treatment and incineration.

Incinerating agent-contaminated wastes allows the waste to be classified as nonhazardous (i.e., 5X).

# 8.3.2.2 Compliance with ARARs

The alternative complies with action- and location-specific ARARs. ARARs regarding hot gas decontamination of structures and debris are presented in the Technology Description Volume, Appendix A, Table A-15; ARARs regarding on-post rotary kiln incineration are presented in the Technology Description Volume, Appendix A, Table A-11; and ARARs regarding nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

## 8.3.2.3 Long-Term Effectiveness and Permanence

Since incinerated debris is assumed to be nonhazardous (i.e., 5X), there is low residual risk with this alternative. Adequacy and reliability of controls are enhanced by the destruction of contaminants through incineration. Wildlife habitat is limited at the landfill.

#### 8.3.2.4 Reduction of TMV

This alternative irreversibly reduces contaminant TMV through the complete thermal destruction of organic contaminants, including Army chemical agent. Hot gas irreversibly reduces the TMV of organics on nonflammable surfaces and produces off gases that require treatment. Rotary kiln incineration is assumed to achieve complete decontamination (i.e., 5X status) through treatment at temperatures exceeding 1,000 degrees Fahrenheit (°F). Off gases produced during the incineration process must be treated. The rotary kiln is the most commonly used type of hazardous waste incinerator, and can effectively process demolition debris. Supplemental fuels are required due to the low heating value of the material. High-ash-content wastes such as bricks and concrete may remain hazardous after incineration if leachable metals are present in the ash.

#### 8.3.2.5 Short-Term Effectiveness

Worker protection is a concern for hot gas treatment because potentially toxic off gases might be produced (Section 8.2.2.5). To protect the community, air controls are required during the conduct of both hot gas treatment and incineration. RAOs are achieved in 1 to 5 years.

# 8.3.2.6 Implementability

This alternative is administratively and technically feasible. However, it is limited to nonflammable surfaces and it is difficult to implement due to the need for materials processing, extensive fuel requirements and, for structures contaminated with inorganics, potential ash disposal concerns. Furthermore, there are concerns regarding the limited reduction in total material volume and community acceptance of the incinerator, and the treatment may compromise the integrity of the structure and isolating the treatment area is difficult. Professional expertise and services for the rotary kiln are readily available, although those for hot gas treatment are not.

#### 8.3.2.7 Cost

The cost of this alternative includes representative air monitoring for analytical verification of the effectiveness of the treatment and for incineration treatment of the emitted gas. It was assumed that only interior surfaces are treated with hot gas and that the entire structure volume is shreddable and is to be incinerated. The present worth cost of this alternative is approximately \$216,000,000, which includes transportation of the debris for use as on-post fill or for placement in the on-post nonhazardous waste landfill.

# 8.4 ALTERNATIVE 14: DISMANTLING, ON-POST HAZARDOUS WASTE LANDFILL

### 8.4.1 Description of Alternative

Alternative 14 includes dismantling the structure, placing the debris and waste in an on-post hazardous waste landfill, and backfilling the structure excavation. Alternative 14 has limited applicability to the No Future Use, Agent History Medium Group. Dismantling and disposing of agent-contaminated structures without treatment is only possible if Army regulations concerning agent handling are satisfied, i.e., Army chemical agent is detected neither before nor after demolition of the structure.

# 8.4.2 Analysis of Alternative

#### 8.4.2.1 Overall Protection of Human Health and the Environment

Alternative 14 offers limited protection of human health and the environment because it assumes that Army chemical agent is not detected during pre- and post-demolition monitoring. If agent is detected, treatment is necessary prior to landfilling, which limits the applicability of this alternative.

## 8.4.2.2 Compliance with ARARs

Alternative 14 complies with action- and location-specific ARARs, but may not satisfy Army regulations concerning the handling of agent if any material does not meet 3X status. ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

## 8.4.2.3 Long-Term Effectiveness and Permanence

There is low residual risk associated with the alternative only if Army chemical agent is not detected. If Army chemical agent is detected in monitoring, Alternative 14 is not applicable.

#### 8.4.2.4 Reduction of TMV

Since Alternative 14 does not include treatment of the structures, it is not effective in reducing toxicity or volume; however, contaminant mobility is minimized by containment. There are no treatment residuals.

#### 8.4.2.5 Short-Term Effectiveness

Dust controls are necessary for community protection. There is a potential for impacts on workers and on the community since there is no treatment of Army chemical agent included in this alternative. RAOs are achieved in 1 to 5 years if no Army chemical agent is detected during monitoring.

# 8.4.2.6 Implementability

This alternative is not administratively feasible if debris does not meet Army decontamination criteria. Materials and services for demolition are readily available.

#### 8.4.2.7 Cost

The cost of this alternative includes transportation to the landfill as well as long-term monitoring and maintenance of the landfill. There are 67 structures amenable to this alternative. The present worth cost for this alternative is \$113,000,000.

# 8.5 ALTERNATIVE 15: DISMANTLING, ON-POST ROTARY KILN INCINERATION, ON-POST NONHAZARDOUS WASTE LANDFILL

# 8.5.1 <u>Description of Alternative</u>

Alternative 15 involves dismantling the structure, incinerating the resulting debris and waste in an on-post rotary kiln, disposing of the incinerator ash in an on-post nonhazardous waste landfill or in Basin A, and backfilling the structure excavation. This alternative is similar to Alternative 6 (Section 8.3) except that it does not include hot gas treatment.

# 8.5.2 Analysis of Alternative

# 8.5.2.1 Overall Protection of Human Health and the Environment

Alternative 15 is protective of human health and the environment because it destroys organic contaminants, including Army chemical agent through incineration.

# 8.5.2.2 Compliance with ARARs

Alternative 15 complies with action- and location-specific ARARs. ARARs regarding on-post rotary kiln incineration are presented in the Technology Description Volume, Appendix A, Table A-11, and ARARs regarding nonhazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-9.

# 8.5.2.3 Long-Term Effectiveness and Permanence

Alternative 15 results in low residual risk because incinerated debris is assumed to be nonhazardous. Residual risk for this alternative may be higher if inorganic contaminants are present in the structural materials. Because contaminants are destroyed during the incineration process, adequacy and reliability of controls are enhanced by incineration. Wildlife habitat is limited at the landfill.

#### 8.5.2.4 Reduction of TMV

This alternative irreversibly reduces contaminant TMV through the complete thermal destruction of organic contaminants at temperatures exceeding 1,000°F. This treatment results in 5X decontamination of the debris. Off gases produced during the incineration process must be treated. The rotary kiln, the most commonly used type of hazardous waste incinerator, can effectively process demolition debris. This process is effective in treating organic contaminants, but ineffective in treating inorganic contaminants. As a result, high-ash-content wastes such as bricks and concrete may require solidification or other treatment after incineration if leachable metals are present in the ash.

#### 8.5.2.5 Short-Term Effectiveness

To ensure the health and safety of the community, air monitoring and controls are required during incineration. RAOs are achieved in 1 to 5 years.

# 8.5.2.6 Implementability

This alternative is administratively and technically feasible, with materials and services readily available. However, it is difficult to implement due to the need for materials processing, extensive fuel requirements and, for structures contaminated with inorganics, ash disposal concerns. Furthermore, there are concerns regarding the limited reduction in total material volume and community acceptance of the incinerator.

#### 8.5.2.7 Cost

It was assumed that the entire structure volume is shreddable and is incinerated. There are 67 structures amenable to this alternative. The present worth cost for this alternative is approximately \$164,000,000.

# 8.6 ALTERNATIVE 17: DISMANTLING, HOT GAS, ON-POST HAZARDOUS WASTE LANDFILL

# 8.6.1 <u>Description of Alternative</u>

This alternative includes dismantling the structure, administering hot gas treatment to the debris and waste, disposing of the treated material in the on-post hazardous waste landfill established for contaminated RMA soils, and backfilling the structure excavation. This alternative is similar to Alternative 4 except that hot gas treatment is performed on the debris.

Dismantled materials are loaded into sealable 20-CY rolloffs in preparation for hot gas treatment. Debris in each rolloff is monitored for agent, and those rolloffs containing agent-contaminated debris are designated for treatment. It was assumed that 5 percent of the materials show detections of agent at actionable levels. Debris that tests negative (3X) for agent is directly disposed at the on-post hazardous waste landfill. Debris that tests positive for agent is transported in the rolloffs to an on-post facility for hot gas treatment. This facility may either be a structure designed and built specifically for the treatment or it may be an existing structure that meets the criteria for treatment. The debris is treated in the rolloff containers and the off gases collected and treated. Following hot gas treatment, the debris is monitored for agent. If agent is detected, the debris undergoes further hot gas treatment until agent is no longer detected. When the debris tests negative for agent, it is transported to the on-post hazardous waste landfill for disposal.

#### 8.6.2 Analysis of Alternative

### 8.6.2.1 Overall Protection of Human Health and the Environment

Alternative 17 is protective of human health and the environment, although hot gas treatment is limited to nonflammable debris.

## 8.6.2.2 Compliance with ARARs

The alternative complies with action- and location-specific ARARs. ARARs regarding hot gas decontamination of structures and debris are presented in the Technology Description Volume, Appendix A, Table A-15, and ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

# 8.6.2.3 Long-Term Effectiveness and Permanence

There is low residual risk associated with this alternative if the contaminants, including Army chemical agent, are associated with nonflammable debris. If contaminants are associated with flammable surfaces, hot gas treatment is not applicable since the controls are not adequate. Wildlife habitat is limited at the landfill.

#### 8.6.2.4 Reduction of TMV

This alternative is effective in irreversibly reducing organic contaminant TMV through the hot gas treatment if the contaminants are associated with nonflammable surfaces. Treatment residuals include off gases that must be collected and treated.

#### 8.6.2.5 Short-Term Effectiveness

Worker protection controls are instituted during hot gas treatment. To ensure the health and safety of the community, air monitoring and emission controls are needed during hot gas treatment. RAOs achieved within 1 to 5 years if the treatment is applicable to all of the contaminated surfaces.

# 8.6.2.6 Implementability

The technical feasibility of Alternative 17 is limited because isolation of the treatment area is difficult, and because hot gas treatment may compromise the integrity of a structure. Materials

undergoing treatment must be stable at operating temperatures and the debris segregated so that combustible materials are removed before the process begins. Alternative 17 assumes that all potential Army chemical agent is effectively treated to 3X by the hot gas treatment. The debris must be monitored for Army chemical agent after demolition. If agent is detected on combustible materials, hot gas treatment will not be applicable and other treatment will be necessary, which limits the effectiveness of this alternative. To date, hot gas treatment has only been developed at the pilot scale, and its effectiveness at full scale is unknown. In addition, the technology is not commercially available and technical expertise is limited. The alternative is administratively feasible.

## 8.6.2.7 Cost

The cost of this alternative includes air monitoring for analytical verification of the effectiveness of the treatment and incineration treatment of the emitted gas. There are 67 structures amenable to this alternative. The present worth cost of this alternative is approximately \$256,000,000, which includes transportation to an on-post hazardous waste landfill.

# 8.7 ALTERNATIVE 18: DISMANTLING, PEROXIDE/HYPOCHLORITE TREATMENT, ON-POST HAZARDOUS WASTE LANDFILL

## 8.7.1 <u>Description of Alternative</u>

This alternative includes dismantling the structure, administering peroxide/hypochlorite treatment to the debris, consolidating the debris in an on-post hazardous waste landfill, and backfilling the structure excavation.

The design of the post-demolition treatment system for this alternative is very similar to the one described in Alternative 17 (Section 8.6). Dismantled materials are loaded into sealable 20-CY-rolloffs in preparation for peroxide/hypochlorite treatment. Debris in each rolloff is monitored for agent, and those rolloffs containing agent-contaminated debris are designated for treatment. It was assumed that 5 percent of the materials show detections of agent at actionable levels. Debris that tests negative for treatment (3X) is directly consolidated at the on-post hazardous

waste landfill. Debris that tests positive for treatment is transported in the rolloffs to an on-post facility for peroxide/hypochlorite treatment. This facility may either be a structure designed and built specifically for the treatment or it may be an existing structure that meets the criteria for treatment. The debris is treated by filling the rolloffs with a peroxide/hypochlorite solution. Waste solution (caustic) from the treatment is drained from the rolloffs, collected, and treated as required. Analysis for potentially toxic byproducts in the spent caustic is performed before it is treated or disposed. Following peroxide/hypochlorite treatment, the debris is monitored for agent. If agent is detected, the debris undergoes further peroxide/hypochlorite treatment until agent is no longer detected. When the debris tests negative for agent, it is transported to the on-post hazardous waste landfill for disposal.

# 8.7.2 Analysis of Alternative

#### 8.7.2.1 Overall Protection of Human Health and the Environment

This alternative is protective of human health and the environment through the treatment of structural debris using peroxide/hypochlorite treatment. Peroxide/hypochlorite is the most commonly used treatment process for agent-contaminated materials since it readily elevates the waste to 3X status.

# 8.7.2.2 Compliance with ARARs

This Alternative 18 complies with action- and location-specific ARARs. ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

# 8.7.2.3 Long-Term Effectiveness and Permanence

There is low residual risk associated with this alternative due to the effective treatment of Army chemical agent. Because agent-contaminated materials are neutralized prior to landfilling, the adequacy and reliability of controls are enhanced by the peroxide/hypochlorite treatment. Wildlife habitat is limited at the landfill.

# 8.7.2.4 Reduction of TMV

Alternative 18 is effective in irreversibly reducing Army chemical agent TMV through the peroxide/hypochlorite treatment process. While the TMV of inorganic contaminants is not affected by peroxide/hypochlorite treatment, this alternative effectively reduces the mobility of these contaminants through the landfilling and long-term monitoring of the debris. A toxic liquid sidestream is produced that must be tested and properly disposed.

# 8.7.2.5 Short-Term Effectiveness

Worker protection is a concern during caustic washing, as is containment and disposal of the spent caustic. The nature of the debris (porous versus nonporous), may necessitate re-treatment to achieve 3X status. Off gases and liquid treatment residuals need to be treated and disposed properly to ensure the health and safety of the community during remediation. RAOs are achieved in 1 to 5 years.

# 8.7.2.6 Implementability

Alternative 18 is technically and administratively feasible. Containment and disposal of spent caustic is an implementation concern. Services and expertise for caustic washing are available.

# 8.7.2.7 Cost

The cost of Alternative 18 includes air monitoring for analytical verification of the effectiveness of the treatment and activated carbon adsorption treatment of the emitted gas. There are 67 structures that are amenable to this alternative. The present worth cost of this alternative is approximately \$122,000,000, which includes transportation to an on-post hazardous waste landfill.

# 8.8 ALTERNATIVE 18a: SAND BLASTING, DISMANTLING, PEROXIDE/HYPOCHLORITE TREATMENT, ON-POST HAZARDOUS WASTE LANDFILL

# 8.8.1 Description of Alternative

Alternative 18a includes sand blasting, dismantling the structure and treating the debris using peroxide/hypochlorite, disposing of the debris in an on-post hazardous waste landfill, and

backfilling the structure excavation. This alternative is similar to Alternative 18, although in situ sand blasting has been added to allow the treatment of contaminants other than Army chemical agent.

# 8.8.2 Analysis of Alternative

# 8.8.2.1 Overall Protection of Human Health and the Environment

Alternative 18a is protective of human health and the environment as described in Section 8.7. Sand blasting is effective for other contaminants of interest in this medium group that are not treated by caustic washing.

# 8.8.2.2 Compliance with ARARs

This alternative complies with action- and location-specific ARARs, and it meets the BDAT for debris treatment. ARARs regarding sand blasting are presented in the Technology Description Volume, Appendix A, Table A-28, and ARARs regarding hazardous waste landfills are presented in the Technology Description Volume, Appendix A, Table A-8.

# 8.8.2.3 Long-Term Effectiveness and Permanence

There is low residual risk associated with this alternative as discussed in Section 8.7. The residual risk and adequacy of controls is enhanced by sand blasting if contaminants other than Army chemical agent are present.

# 8.8.2.4 Reduction of TMV

A solid waste stream is produced from the grit and removed structural material. This alternative is effective in irreversibly reducing Army chemical agent TMV through the peroxide/hypochlorite treatment process, although a toxic liquid sidestream is produced. Conversely, sand blasting removes surficial contaminants, reducing only the mobility and volume of the contaminants by removing them from the structure. Furthermore, waste sand-blasting materials may require peroxide/hypochlorite treatment, so the resulting waste stream must be characterized and disposed.

# 8.8.2.5 Short-Term Effectiveness

Worker protection is a concern during sand blasting and caustic washing, as is containment and disposal of spent caustic. Air controls and monitoring are needed during treatment for community protection. RAOs are achieved in 1 to 5 years.

# 8.8.2.6 Implementability

Sand blasting is a concern in Army chemical agent structures since there is a possibility of liberating additional agent contamination from the subsurface during treatment. In addition, the complexity of the physical configuration of the structure (i.e., the inaccessibility of corners or recesses) could limit the effectiveness of the treatment. As a result, not all contaminated surfaces may be treated, depending on the configuration of each structure. Effectiveness of this alternative varies from structure to structure. The nature of the debris (porous verses nonporous), may necessitate retreatment to achieve 3X status. Off gases and liquid treatment residuals must be treated and disposed properly. Peroxide/hypochlorite technology is the most commonly used decontamination method for Army chemical agent, and materials are readily available. The alternative is administratively feasible.

# 8.8.2.7 Cost

The cost of this alternative includes air monitoring for analytical verification of the effectiveness of the treatment and activated carbon adsorption treatment of the emitted gas. There are 67 structures amenable to this alternative. The present worth cost of Alternative 18a is approximately \$122,000,000, which includes transportation to an on-post hazardous waste landfill.

Cri	teria	ALT. 1: No Action	ALT. 4: Hot Gas, Dismantling, On-Post Hazardous Waste Landfill		
1.	Overall protection of human health and environment	Not protective; does not achieve RAOs.	Protective; treatment limited to organics on nonflammable surfaces. Debris contained by landfilling.		
2.	Compliance with ARARs  -Action-specific ARARs  -Location-specific ARARs  -Criteria, advisories, and guidance	Does not comply with location-specific ARARs, action-specific ARARs do not apply.	Complies with action- and location- specific ARARs		
3.	Long-term effectiveness and permanenceMagnitude of residual risksAdequacy and reliability of controlsHabitat impacts	Risk and habitat unchanged. No controls used.	Low residual risk, structural debris contained by landfilling. Adequate controls, long-term monitoring required.  Habitat improved at site, but limited at landfill.		
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	No reduction in TMV.	Hot gas irreversibly reduces TMV of organics on nonflammable surfaces. Off gases produced.  Landfill reduces mobility, but may be reversible if landfill leaks.		
5.	Short-term effectiveness -Protection of workers during remedial action -Protection of community during remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	No worker protection necessary and no habitat improvement since no action taken.  RAOs are not achieved.	Worker protection a concern for hot gas treatment, potentially toxic off gases produced. Dust controls needed for demolition.  Positive habitat impacts at site.  RAOs are achieved in 1 to 5 years.		
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and materials	Technically and administratively feasible.	Limited to nonflammable surfaces. May compromise structural integrity. Isolation of treatment area may be difficult.  Administratively feasible.  Hot gas services and expertise limited.		
7.	Cost <sup>1</sup> -Present worth cost	\$0	\$181,000,000		

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

Table 8.0-1 Comparative Analysis of Alternatives, No Future Use, Agent History Medium Group

Page 2 of 4

Cri	teria	ALT. 6: Hot Gas, Dismantling, On-Post Rotary Kiln Incineration, On-post Nonhazardous Waste Landfill	ALT. 14: Dismantling, On-Post Hazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, debris treated by incineration, contained by landfilling.	Protectiveness limited, debris contained by landfilling, but agent not treated.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidance	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs, but may not satisfy Army regulations concerning agent handling.	
3.	Long-term effectiveness and permanence  -Magnitude of residual risks  -Adequacy and reliability of controls	Low residual risk, incinerated debris nonhazardous. Adequate controls, long-term maintenance required.	Low residual risk only if agent not detected; structural debris contained by landfilling. Adequate controls, long-term monitoring required.	
	-Habitat impacts	Habitat improved at site, but limited at landfill.	Habitat improved at site, but limited at landfill.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated	Hot gas irreversibly reduces TMV of organics on nonflammable surfaces. Off gases produced.	Debris not treated, no reduction in toxicity or volume.	
	-Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Incineration irreversibly reduces TMV, renders debris nonhazardous. Off gases are produced.	Landfilling reduces mobility, but may be reversible if landfill leaks.	
5.	Short-term effectiveness -Protection of workers during	Worker protection a concern for hot gas treatment, potentially toxic off	Dust control needed for demolition.	
	remedial action -Protection of community during	gases produced. Dust controls needed for demolition. Air controls needed for	Positive habitat impacts at site.	
	remedial action -Environmental impacts of remedial actions	incineration.  Positive habitat impacts at site.	RAOs are achieved in 1 to 5 years.	
	-Time until RAOs are achieved	RAOs are achieved in 1 to 5 years.		
6.	Implementability -Technical feasibility -Administrative feasibility -Availability of services and materials	Limited to nonflammable surfaces. May compromise structural integrity. Isolation of treatment area difficult. Administratively feasible. Hot gas services and expertise limited.	Technically and administratively feasible, but may not satisfy Army regulations concerning agent handling.  Materials and services readily available.	
7.	Cost <sup>1</sup>	not gas services and experiese infinites.	\$113,000,000	
••	-Present worth cost	\$216,000,000		

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

Table 8.0-1 Comparative Analysis of Alternatives, No Future Use, Agent History Medium Group

Page 3 of 4

Cri	teria	ALT. 15: Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill	ALT. 17: Dismantling, Hot Gas, On-Post Hazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, debris is treated by incineration, contained by landfilling.	Protective, treatment limited to organics on nonflammable debris surfaces. Debris contained by landfilling.	
2.	Compliance with ARARs  -Action-specific ARARs  -Location-specific ARARs  -Criteria, advisories, and guidance	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs	
3.	Long-term effectiveness and permanence -Magnitude of residual risks -Adequacy and reliability of	Low residual risk, incinerated debris nonhazardous. Adequate controls, long-term maintenance required.	Low residual risk, structural debris contained by landfilling. Adequate controls, long-term monitoring required.	
	controls  -Habitat impacts	Habitat improved at site, but limited at landfill.	Habitat improved at site, but limited at landfill.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated	Incineration irreversibly reduces TMV. Debris is rendered nonhazardous. Off gases are produced.	Hot gas irreversibly reduces TMV of organics on nonflammable debris surfaces. Off gases are produced.	
	-Degree and quantity of TMV reduction -Irreversibility of TMV reduction -Type and quantity of treatment residuals	Landfilling reduces mobility, but may be reversible if landfill leaks.	Landfilling reduces mobility, but may be reversible if landfill leaks.	
5.	Short-term effectiveness  -Protection of workers during remedial action -Protection of community during	Dust controls needed for demolition.  Air controls needed for incineration.  Positive habitat impacts at site.	Worker protection a concern for hot gas treatment, potentially toxic off gases produced. Dust controls needed for demolition.	
	remedial action -Environmental impacts of remedial actions -Time until RAOs are achieved	RAOs are achieved in 1 to 5 years.	Positive habitat impacts at site.  RAOs are achieved in 1 to 5 years.	
6.	Implementability  -Technical feasibility  -Administrative feasibility	Technically and administratively feasible.	Hot gas limited to nonflammable debris surfaces. Isolation of treatment area may be difficult. Administratively feasible.	
	-Availability of services and materials	Services and materials readily available.	Hot gas services and expertise limited.	
7.	Cost <sup>1</sup> -Present worth cost	\$164,000,000	\$256,000,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

Table 8.0-1 Comparative Analysis of Alternatives, No Future Use, Agent History Medium Group

Page 4 of 4

Criteria		ALT. 18: Dismantling, Peroxide/ Hypochlorite Treatment, On-Post Hazardous Waste Landfill	ALT. 18a: Sand Blasting, Dismantling, Peroxide/ Hypochlorite Treatment, On-Post Hazardous Waste Landfill	
1.	Overall protection of human health and environment	Protective, treatment limited to surface Army chemical agent, debris contained by landfilling.	Protective, surface contaminants and Army chemical agent treated, debris contained by landfilling.	
2.	Compliance with ARARs -Action-specific ARARs -Location-specific ARARs -Criteria, advisories, and guidance	Complies with action- and location-specific ARARs.	Complies with action- and location-specific ARARs.	
3.	Long-term effectiveness and permanence  -Magnitude of residual risks  -Adequacy and reliability of	Low residual risk, structural debris contained by landfilling. Adequate controls, long-term monitoring required.	Low residual risk, structural debris contained by landfilling. Adequate controls, long-term monitoring required.	
	controls -Habitat impacts	Habitat improved at site, but limited at landfill.	Habitat improved at site, but limited at landfill.	
4.	Reduction in TMV through treatment -Treatment process used and materials treated -Degree and quantity of TMV reduction	Caustic wash irreversibly reduces TMV of Army chemical agent on surfaces of materials No other contaminants treated. Toxic liquid side stream produced.	Sand blasting removes surface contaminants. Solid waste stream produced. Caustic wash irreversibly reduces TMV of surface army agent. Toxic liquid side stream produced.	
	-Irreversibility of TMV reduction -Type and quantity of treatment residuals	Landfilling reduces mobility, but may be reversible if landfill leaks.	Landfilling reduces mobility, but may be reversible if landfill leaks.	
5.	Short-term effectiveness  -Protection of workers during remedial action  -Protection of community during remedial action	Worker protection a concern for caustic washing. Containment and disposal of spent caustic a concern. Dust controls needed for demolition.	Worker protection a concern for caustic washing and sand blasting. Containment and disposal of caustic a concern. Dust controls needed for demolition.	
	-Environmental impacts of remedial actions -Time until RAOs are achieved	Positive habitat impact at site.	Positive habitat impacts at site.  RAOs are achieved in 1 to 5 years.	
_		RAOs are achieved in 1 to 5 years.	·	
6.	Implementability  -Technical feasibility  -Administrative feasibility  -Availability of services and	Containment and disposal of caustic a concern. Administratively and technically feasible.	Containment and disposal of caustic a concern. Sand blasting a concern for Army chemical agent structures. Administratively feasible.	
	materials	Caustic washing services available.	Caustic washing services limited.	
7.	Cost <sup>1</sup> -Present worth cost	\$122,000,000	\$122,000,000	

ARARs Applicable or Relevant and Appropriate Requirements

CY Cubic Yards

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4

# 9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

9.1 NO FUTURE USE, MANUFACTURING HISTORY-PROCESS HISTORY SUBGROUP There were 12 alternatives analyzed for the Process History Subgroup (Table 1.2-1). Alternative 1, No Action and Alternative 2, Pipe Plugs, Locks/Boards/Fences/Signs were removed from the selection process because these alternatives are not compatible with the alternatives chosen for the soils media, which necessitate the removal of structures to reach the underlying soils for remediation (Section 2.3). The remaining ten alternatives, which involve the removal and disposal of the structures, are compared in the following sections.

# 9.1.1 Overall Protection of Human Health and the Environment

All of the alternatives provide adequate protection of human health and the environment since the resulting structural debris is contained by landfilling, capping, or consolidation. On-post disposal of the debris is more protective than off-post disposal because on-post disposal offers direct control over long-term waste management and because off-site transportation is not necessary, which adds to the protection of the community.

# 9.1.2 Compliance with ARARs

As described in the individual analyses of the alternatives, each of the alternatives is in compliance with all applicable ARARs.

# 9.1.3 Long-Term Effectiveness and Permanence

The residual risk for each of the alternatives is low since the ultimate disposition of the debris is through landfilling, capping, or consolidation. Treatment of the structures prior to demolition does not lower the residual risk significantly since the in situ treatments do not destroy the contaminants present, but merely remove them from structural surfaces. Incineration of the debris does destroy contaminants, but the resulting ash may still be hazardous if heavy metal contamination is present.

Landfilling, capping, or consolidation of the structural debris provides adequate controls for the debris. If the ultimate disposal area is on post, long-term monitoring and maintenance of the disposal area is necessary to maintain adequate controls. If the ultimate disposal area is off post, long-term monitoring and maintenance is included in the disposal cost, although there is no direct control of the waste management.

Since each of the ten alternatives includes the removal of structures, the habitat is improved at the location of the structure. If the ultimate disposal area is on post, the habitat is limited at the disposal location due to the need to exclude burrowing animals from the landfill or capping area.

# 9.1.4 Reduction of TMV

All of the treatments offer some degree of irreversible reduction in contaminant TMV. All of the treatment technologies have limitations in that they are only applicable to certain contaminants on certain surfaces. Hot gas treatment is only applicable for organic contaminants on nonflammable surfaces. Vacuum dusting is only amenable to contaminants associated with dust that is not bound to a surface. Steam cleaning is only amenable to contaminants on nonporous surfaces. Sand blasting is amenable to near-surface contamination on most surfaces, and is the most universally applicable in situ treatment for the structures medium. Incineration, which treats structural debris, is not amenable wastes to contaminated with metals, although it offers the greatest degree of irreversible reduction in contaminant TMV.

Landfilling, capping, or consolidation offers a reduction in mobility for all contaminants through containment. The reduction in mobility may be reversed if the disposal area leaks. Proper long-term monitoring and maintenance of the disposal area can prevent leakage from occurring.

Hot gas treatment produces large quantities of potentially toxic off gases that must be collected and treated. Vacuum dusting and sand blasting produce potentially hazardous solid waste streams, although sand blasting produces more waste than vacuum dusting since the process removes part of the surface being treated. Steam cleaning produces a potentially hazardous liquid

sidestream. Incineration not only produces a gaseous sidestream that must be treated but ash that may still be considered hazardous.

Landfilling, capping, and consolidation may produce gaseous and liquid (leachate) sidestreams due to decomposition of organic materials. These volumes are small compared to the volume of waste and are produced slowly over time.

# 9.1.5 Short-Term Effectiveness

For demolition, standard worker protection is necessary both for physical and chemical hazards. All treatments require worker protection. Worker protection for hot gas treatment is a concern due to the aggressive nature of the treatment.

The off gases produced from hot gas treatment and incineration must be captured and treated to ensure the health and safety of the community. Contaminated dust, however, is the greatest concern for the community. Dust controls during demolition and transportation activities are necessary to protect the community during remedial actions.

The environmental impacts associated with these remedial alternatives are low if the dust that is produced is adequately controlled. The time needed to complete any of these alternatives is short, less than 5 years, which lessens the environmental impact. Alternatives that do not involve treatment have less of an impact because the period of performance is shorter and because there are no potentially hazardous treatment sidestreams and residuals produced.

For all ten of the alternatives, RAOs are achieved in less than 5 years. RAOs are achieved most rapidly by disposing the debris on post without treatment.

# 9.1.6 <u>Implementability</u>

All of the alternatives are technically feasible to some degree. Demolition, transportation, and landfilling or capping are all standard technologies that are technically feasible. Section 9.1.4

describes the limitations of the treatment technologies. In hot gas treatment, isolation of the treatment area and the possibility for compromising the integrity of a structure limits the technical feasibility for that treatment technology.

All of the alternatives are administratively feasible. There are long-term liability concerns associated with off-post disposal of debris since there is no direct control over long-term waste management.

Services and materials are readily available for all options except hot gas. Since hot gas treatment is still under development, expertise and services are very limited.

# 9.1.7 Cost

The majority of the cost for these alternatives is related to activities associated with demolition, transportation, and disposal. Off-post transportation and disposal is significantly more expensive than on-post disposal. In situ treatments (vacuum dusting, steam cleaning, and sand blasting) do not add appreciably to the costs. Hot gas treatment and incineration are capital-intensive treatment technologies that add significantly to the cost of an alternative. Off-post incineration is the most expensive treatment option. Costs range from a high of \$528,000,000 for Alternative 12 (which involves off-post incineration and disposal) to \$30,900,000 for Alternative 21a (which involves demolition and consolidation of the debris with the soils medium). The cost of IRAs and ongoing actions described in Section 2.2.3 and listed in Table 9.4-4 not included in the remediation costs.

# 9.2 NO FUTURE USE, MANUFACTURING HISTORY–NON-PROCESS HISTORY SUBGROUP

Six alternatives were analyzed for the Non-Process History Subgroup (Table 1.2-1). Alternative 1, No Action and Alternative 2a, Locks/Boards/Fences/Signs were not retained for evaluation as the preferred alternative. These alternatives leave the structures in place and do not provide a permanent solution since the structures require long-term maintenance and present

a continued physical hazard. In addition, many of the structures in this medium group must be removed to allow soils remediation to proceed. The remaining four alternatives, which involve removing the structures and disposing of the debris, are compared in the following sections. The range of alternatives for this subgroup is similar to the range of alternatives for the Process History Subgroup except that treatment alternatives are not necessary prior to disposal of structure debris.

# 9.2.1 Overall Protection of Human Health and the Environment

All of the alternatives provide adequate protection of human health and the environment since the resulting structural debris is contained by landfilling, capping, or consolidation. On-post disposal of the debris is more protective than off-post disposal because on-post disposal offers direct control over long-term waste management.

# 9.2.2 Compliance with ARARs

As described in the individual analysis of the alternatives, each of the alternatives is in compliance with all applicable ARARs.

# 9.2.3 Long-Term Effectiveness and Permanence

The residual risk for each of the alternatives is very low since the ultimate disposition of the debris is through landfilling, capping, or consolidation, and the resulting debris from these structures is expected to be nonhazardous.

Landfilling, capping, or consolidation of the structural debris provides adequate controls for the debris. If the ultimate disposal area is on post, long-term monitoring and maintenance of the disposal area is necessary to maintain adequate controls. If the ultimate disposal area is off post, long-term monitoring and maintenance is included in the disposal cost, although there is no direct management of the waste.

Since all four of the alternatives include the removal of structures, the wildlife habitat is improved at the location of the structure under any of the alternatives. If the ultimate disposal area is on post, the habitat is limited at the disposal location due to the need to exclude burrowing animals from the landfill or capping area.

# 9.2.4 Reduction of TMV

Since the structural debris from this subgroup is expected to be nonhazardous, reduction in TMV is not applicable.

Landfilling, capping, and consolidation may produce gaseous and liquid (leachate) sidestreams due to decomposition of organic materials. These volumes are small compared to the volume of waste and are produced slowly over time.

# 9.2.5 Short-Term Effectiveness

Standard worker protection is necessary during demolition for both physical and chemical hazards. Contaminated dust is the greatest concern for the community. Even though the structures in this subgroup are not expected to be contaminated, they are in production areas and contaminated dust may be generated from the surrounding area. Dust controls during demolition and transportation activities are necessary to protect the community during the remedial action.

The environmental impacts associated with these remedial alternatives are low, assuming that the dust produced is adequately controlled. The time needed to complete any of these alternatives is less than 5 years, which lessens the environmental impact. Since these alternatives do not involve treatment, and the structures in this subgroup are assumed to be free from contamination, the environmental impacts are very low.

RAOs are achieved in less than 5 years for all of the alternatives. RAOs are achieved most rapidly by disposing the debris on post.

# 9.2.6 <u>Implementability</u>

All of the alternatives are technically feasible. Demolition, transportation, and landfilling or capping are all standard technologies that are technically feasible.

All of the alternatives are administratively feasible. There are long-term liability concerns associated with off-post disposal of the debris since there is no direct control over long-term waste management. Services and materials for these options are readily available.

# 9.2.7 Cost

The costs for these alternatives are based primarily on activities associated with demolition, transportation, and disposal. Off-post transportation and disposal is significantly more expensive than on-post disposal. Hazardous waste disposal is more expensive and may not be necessary for the structures in this medium group. The costs range from \$13,900,000 for Alternative 19a (which involves demolition and disposal on-site) to \$8,630,000 for Alternative 2a (which involves locks, boards, fences, and signs). The cost of IRAs and ongoing actions described in Section 2.2.3 listed in Table 9.4-4 are not included in the remediation costs.

# 9.3 NO FUTURE USE, AGENT HISTORY MEDIUM GROUP

Eight alternatives were analyzed for the No Future Use, Agent History Medium Group (Table 1.2-2). Alternative 1, No Action was removed from the selection process because this alternative leaves the structures in place, and does not provide a permanent solution since the structures require long-term maintenance and present a continued physical hazard. In addition, many of the structures in this medium group must be removed to allow soils remediation to proceed. The remaining seven alternatives, which involve removing the structures and disposing of the debris, are compared in the following sections.

# 9.3.1 Overall Protection of Human Health and the Environment

The seven remaining alternatives can potentially satisfy AR 385-131 and therefore provide adequate protection of human health and the environment. The resulting structural debris is

contained in an on-post hazardous waste landfill or is incinerated and then contained in an on-post nonhazardous waste landfill.

# 9.3.2 Compliance with ARARs

Each of the alternatives is in compliance with all applicable ARARs. It should be noted that Alternative 14 is only in compliance if no Army chemical agent is detected at actionable levels.

# 9.3.3 Long-Term Effectiveness and Permanence

The residual risk for all of the alternatives is low since the ultimate disposition of the debris occurs at an on-post landfill. The disposal of the structural debris in an on-post landfill provides adequate controls for the debris. Since the ultimate disposal area is on post, long-term monitoring and maintenance of the disposal area is necessary to maintain adequate controls.

Since all alternatives include the removal of structures, the habitat is improved at the former location of the structure. The habitat, however, is limited at that location due to the need to exclude burrowing animals from the landfill area.

# 9.3.4 Reduction of TMV

All of the treatments offer some degree of irreversible reduction in contaminant TMV. All of the treatment technologies have limitations that are only applicable to certain contaminants on certain surfaces, and most of the treatment technologies are geared to the treatment of Army chemical agent. Hot gas treatment is only amenable to Army chemical agent and other organic contaminants on nonflammable surfaces. Peroxide/hypochlorite treatment is the most commonly used method for treating agent-contaminated material. Sand basting is amenable to near-surface contamination on most surfaces. Sand blasting is the most universally applicable in situ treatment for the structures medium, although additional treatment of the waste may be necessary if agent is present. Peroxide/hypochlorite and hot gas treatments elevate agent-contaminated waste to a 3X status, which allows the waste to be disposed in a hazardous waste landfill. Incineration, however, elevates agent-contaminated waste to a 5X status, which allows the waste

to be disposed in a nonhazardous waste landfill. Incineration, therefore, offers the greatest degree of irreversible reduction in chemical agent TMV.

Landfilling offers a reduction in mobility for all contaminants through containment. The mobility reduction can be reversed if the landfill leaks. Proper long-term monitoring and maintenance of the landfill can prevent leakage from occurring.

Hot gas treatment produces large quantities of potentially toxic off gases that must be collected and treated. Sand blasting produces potentially hazardous solid waste streams that may contain Army chemical agent. Incineration not only produces a gaseous sidestream that must be treated but also ash that may still be considered hazardous.

Landfilling may produce gaseous and liquid (leachate) sidestreams due to decomposition of organic materials. These volumes are small compared to the volume of waste and are produced slowly over time.

# 9.3.5 <u>Short-Term Effectiveness</u>

Worker protection is necessary during demolition for both physical and chemical hazards, and must include protection for possible agent contamination. All treatments require worker protection for Army chemical agent. Worker protection for hot gas treatment is a concern due to the aggressive nature of the treatment.

The off gases produced from hot gas treatment and incineration must be captured and treated to ensure the health and safety of the community. Contaminated dust, however, is the greatest concern for the community. Dust controls during demolition and transportation activities are necessary to protect the community during the remedial action.

The environmental impacts associated with these remedial alternatives are low assuming that the dust produced is adequately controlled. The time needed to complete any of these alternatives

is less than 5 years, which lessens the environmental impact. Alternatives that do not involve treatment have a lower impact because these alternatives are completed more rapidly and because there are no potentially hazardous treatment sidestreams and residuals produced. RAOs are achieved in less than 5 years for all seven of the alternatives.

# 9.3.6 Implementability

All of the alternatives are technically feasible to some degree. Demolition, transportation, and landfilling or capping are all standard technologies that are technically feasible. Section 9.3.4 describes the technical limitations of the treatment technologies. Isolation of the treatment area and the possibility of compromising the integrity of a structure during hot gas treatment limits the technically feasibility of that treatment technology, and the possibility of liberating additional Army chemical agent contamination from the subsurface during sand blasting limits the technical feasibility of that treatment technology. All of the alternatives are administratively feasible. Services and materials are readily available except for those associated hot gas treatment. Since hot gas treatment is still under development, expertise and services are very limited.

# 9.3.7 Cost

The majority of the costs for these alternatives is related to demolition, transportation, and disposal. In situ treatment of sand blasting does not appreciably add to the costs. Hot gas treatment and incineration are capital-intensive treatment technologies that significantly add to the cost of alternatives. The costs range from \$256,000,000 for Alternative 17 (which involves demolition, hot gas treatment, and disposal) to \$113,000,000 for Alternative 14 (which involves no treatment and disposal of the waste in an on-post hazardous waste landfill). The cost of IRAs and ongoing actions described in Section 2.2.3 listed in Table 9.4-4 are not included in the remediation costs.

# 9.4 SELECTION OF PREFERRED ALTERNATIVES

# 9.4.1 No Future Use, Manufacturing History-Process History Subgroup

The preferred alternative for the Process History Subgroup is Alternative 21a, consolidation of the structural debris in Basin A without treatment at a cost of \$30,900,000. The treatment of the structures does not add significantly to the overall protectiveness and permanence of the alternatives. On-post disposal is advantageous over off-post disposal due both to cost savings associated with on-post disposal and to the reduced long-term liability due to the direct control over long-term monitoring and maintenance. Consolidation of the debris integrates well with the preferred alternatives for the soils medium. The addition of structural debris can act as a barrier to burrowing animals, which is necessary in capped areas. Table 9.4-1 summarizes the selection process for the Process History Subgroup.

On February 16, 1993, the EPA issued an important new RCRA rule called Corrective Action Management Units and Temporary Units; Corrective Action Provisions; Final Rule (CAMU rule) that can increase flexibility for RCRA and Superfund cleanups (58 Fed. Reg. 8658). It allows EPA (RAs) to define Corrective Action Management Units (CAMUs) within which RCRA land disposal restrictions (LDRs) and Minimum Technology Requirements (MTRs) do not apply. It also allows RAs to define Temporary Units (TUs) to be used for storing or treating hazardous wastes at a facility for RCRA corrective action purposes. It is a final rule and it became effective April 15, 1993. If LDRs become an issue, treatment to comply with the RCRA Debris Rule both prior to and after demolition would be advantageous since treated structural material would be considered nonhazardous. If this happens, the most feasible treatment method would be sand blasting.

# 9.4.2 No Future Use, Manufacturing History-Non-Process History Subgroup

The preferred alternative for the Non-Process History Subgroup is Alternative 21a, consolidation of the debris in Basin A without treatment at a cost of \$10,600,000. The rationale for selecting this alternative is the same as discussed in Section 9.4.1. Since the debris associated with these

structures is expected to be nonhazardous, treatment is not necessary. Table 9.4-2 summarizes the selection process for the Non-Process History Subgroup.

# 9.4.3 No Future Use, Agent History Medium Group

The preferred alternative for the Agent History Medium Group is Alternative 18, demolition followed by a caustic wash of any debris that does not meet the requirements for 3X status and placement in a separate cell in an on-post hazardous waste landfill at a cost of \$122,000,000. The selection of this alternative assumes that air monitoring for Army chemical agent is performed before and after demolition to confirm 3X status of the structural debris. Only the materials that fail 3X air monitoring criteria are treated by the caustic wash. The direct control afforded by on-post landfilling is also advantageous for structures within this medium group. Table 9.4-3 summarizes the selection process for the Agent History Medium Group.

# 9.5 RISK MANAGEMENT ISSUES

Since high-level contamination is not expected to be associated with the majority of the structures, the risks associated with short-term worker and community exposure, as well as the long-term risks associated with waste management, are expected to be low. Selected portions of the process history structures, however, have the potential for containing low levels of organochlorine pesticides (OCPs) and metals, and there is potential for encountering chemical residues in process piping and tanks that are being removed under chemical-process-related activities. Moreover, there are unique risk management concerns associated with the potential presence of Army chemical agent in structures. Accordingly, this section addresses risk management issues associated with the preferred alternatives selected for the No Future Use, Manufacturing History and No Future Use, Agent History Medium Groups.

The No Future Use, Manufacturing History Medium Group consists of 788 structures divided into two subgroups: process history (365 structures) and non-process history (423 structures). The preferred alternative for both of these subgroups is the demolition of structures and the subsequent consolidation of the debris. Dust controls are necessary for the protection of site

workers and the community. Removing and disposing the structures has significantly less long-term risk than leaving the structures in place and restricting access to them. In addition, the majority of the structures must be removed to accommodate the soils remedial alternatives.

Disposing the debris on post offers better control over waste placement and management than does off-post disposal. Therefore, on-post disposal offers a lower long-term risk than off-post disposal. Since the majority of the debris is expected to be nonhazardous, the differences in risk associated with landfilling or capping versus consolidation is minimal. In addition, treating the debris does not lower long-term risk significantly and may increase the short-term exposure potential for site workers. However, if post-demolition sampling detects contaminants above the action levels set by the final ARARs, waste treatment may be required prior to placement.

The No Future Use, Agent History Medium Group consists of 67 structures. In general, the risk management issues for these structures are similar to the issues that pertain to the No Future Use, Manufacturing History Medium Group, but there are also concerns unique to structures with potential Army chemical agent presence.

The preferred alternative for this medium group includes demolishing the structures, administering peroxide/hypochlorite treatment of the debris as necessary, and disposing of the debris in an on-post hazardous waste landfill. Air monitoring and dust controls are necessary for the protection of site workers and the surrounding community. The short-term risks associated with demolition are potentially high due to the possible release of Army chemical agent. The highest probability of encountering agent residues is in process piping and tanks, which are currently being treated and removed as part of the chemical-process-related activities. The potential for encountering agent associated with building materials is low.

9.6 SUMMARY OF PREFERRED ALTERNATIVES FOR THE STRUCTURES MEDIUM Tables 9.4-1 through 9.4-3 summarize the preferred alternatives for the structures medium groups/subgroups. Table 9.4-4 summarizes the costs for the preferred alternatives and the costs

for ongoing actions/IRAs that are an integral part of the structures remediation. The present worth cost for structures remediation, including on-going actions/IRAs, is \$294,000,000. The total cost for structures remediation, including on-going actions/IRAs, is \$297,000,000. Refer to Sections 4 through 8 for the descriptions and evaluations of the alternatives applicable to each medium group or subgroup.

The selection of alternatives for the structures medium considers the statutory requirements of CERCLA and the expectations of the National Contingency Plan (NCP), which states that the selected alternative must:

- Protect human health and the environment
- · Comply with ARARs unless a waiver is justified
- Be cost effective
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment as a principal element (of the remedy), or provide an explanation in the ROD why the preference was not met.

The preferred alternatives for the structures medium include dismantling the structures and containing the debris on post. The majority of the debris is expected to be nonhazardous or contain low to undetectable levels of contamination, and so it is expected to pose a relatively low long-term risk. However, sampling or treatment is conducted to comply with any ARARs.

# 9.6.1 Cost

All costs were developed in accordance with EPA guidance (EPA-OERR 1988b). There are several on-going activities that are not included in the remediation cost developed in this document. The costs of these activities, listed in Table 9.4-4, contribute significantly to the total cost of structures remediation. The estimated cost to complete the ongoing activities is \$130,000,000, which is slightly more than the estimated \$167,000,000 remedial cost in the

feasibility study (FS). In addition, there are several other indirect costs that are not reflected in the cost estimate. These include the following:

- The cost of operating and maintaining the future use structures
- The cost of managing nonmanufacturing structures that are outside the CERCLA process
- The cost of operating RMA throughout the duration of the remediation.

The costs discussed above, will add to the total remediation costs for structures.

As discussed in Section 6 of the Technology Description Volume a centralized landfill was evaluated. The landfill was sized based on the largest volume of contaminated soil and structural debris from the landfill alternatives for the soils and structures media (7.5 million BCY). Based on the preferred alternatives for the structures and soils media the volume of material that will be landfilled is 1.0 million BCY; thus the size of the landfill facility can be reduced. The adjustments to the landfill construction cost are discussed in Section 20 of the soils volume.

# 9.6.2 Phasing

The remediation of RMA is an integral process involving soil, water, and structures media (Section 2.3). In general, the majority of the structures must be removed in order to access and remediate underlying or adjacent soils. The structures demolition must begin in the areas that the soils remediation needs to access so that the soils remediation schedule is not impacted. In addition, the structures demolition must be coordinated with the construction dewatering effort in South Plants so that the heavy equipment and manpower necessary for demolition do not adversely affect well and transfer line placement and operation. In addition, structures covered under any chemical weapons agreements may need to be removed first to comply with the requirements of the agreements.

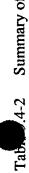
The demolition of structures is a relatively rapid process. Basin A and the hazardous waste landfill may not be ready to accept waste during the time frame that the structures demolition occurs, so structural debris may have to be stockpiled prior to disposal. In general, structures must be removed first in order to ensure the efficient execution of the remediation of the other

media. Since the time frame needed to demolish the structures is relatively short, structures remediation should not hinder the remainder of the remediation efforts.

Summary of Preferred Alternatives, No Future Use, Manufacturing History Medium Group -	cess History Subgroup
Summa	Process
Table 9.4-1	

1 able 9.4-1	Process	Table 9.4-1 Summing of Freelica Affection 1.00 Future OSC, Mandacaning Mistory Median Story Process History Subgroup	Manuactumis mistory me	Page 1 of 1
Subgroup Name	Retain	Retained Alternatives from DSA	Preferred Alternative	Rationale for Selection
Process History	1:	No Action (NA1) Pipe Plugs, Locks/Boards/Fences/Signs (NA2)	21a: Dismantling, Salvage, Consolidation (NA21a)	Achieves threshold criteria; costeffective alternative. Long-term effectiveness enhanced by removal of
	<b>∞</b>	Hot Gas, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA8)		structures. Consolidation integrates well with several soils alternatives. The cost
	<u>6</u> .	Vacuum Dusting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA9)		of this alternative is \$30,900,000.
	9a:	Steam Cleaning, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA9a)		
	10:	Sand Blasting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill (NA10)		
	12:	Dismantling, Salvage, Off-Post Rotary Kiln Incineration, Off-Post Hazardous Waste Landfill (NA12)		
	13:	Dismantling, Salvage, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill (NA13)		
	19:	Dismantling, Salvage, On-Post Hazardous Waste Landfill (NA19)		
	20:	Dismantling, Salvage, Off-Post Hazardous Waste Landfill		
	21: 21a:	Dismantling, Salvage, Clay Cap (NA21) Dismantling, Salvage, Consolidation (NA21a)		

<sup>&</sup>lt;sup>1</sup> Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4.



# Summary of Preferred Alternatives, No Future Use, K. Mufacturing History Medium Group – Non-Process History Subgroup

Page 1 of 1

Subgroup Name	Retai	Retained Alternatives from DSA	Preferred Alternative	Rationale for Selection Achieves threshold criteria: cost-
History	2a: 19a: 20a: 21: 21:	Locks/Boards/Fences/Signs (NA2a) Dismantling, Salvage, On-Post Nonhazardous Wastc Landfill (NA19a) Dismantling, Salvage, Off-Post Nonhazardous Waste Landfill (NA20a) Dismantling, Salvage, Clay Cap Dismantling, Salvage, Consolidation (NA21a)	Consolidation (NA21a)	effective. Long-term effectiveness enhanced by removal of structures. Consolidation integrates well with several soils alternatives. The cost of this alternative is \$10,600,000.

Structures DAA

RMA.DAA 7/93 js

Costs do not include the costs of ongoing activities described in Section 2.2.3 and listed in Table C-29. Development and Serening of Alternatives

DSA (1)

Subgroup Name	Retain	Retained Alternatives from DSA	Ргебетте	Preferred Alternative	Rationale for Selection
None	<u> </u>	No Action (NH1)	<u>:8</u> :	Dismantling, Peroxide/	Achieves threshold criteria;
	<del>4</del> ;	Hot Gas, Dismantling, On-Post Hazardous Waste Landfill (NH4)		Hypochlorite, On-Post Hazardous Waste	complies with AR 385-131.  Long-term effectiveness enhanced
	9:	Hot Gas, Dismantling, On-Post Rotary Kiln		Landfill (NH18)	by removal of structures.
		Incineration, On-Post Nonhazardous Waste Landfill (NH6)			Separate cell in landfill may be required for 3X materials. The
	<del>7</del>	Dismantling, On-Post Hazardous Waste Landfill (NH14)			cost of this alternative is \$122,000,000.
	15:	Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill (NH15)			
	17:	Dismantling, Hot Gas, On-Post Hazardous Waste Landfill (NH17)			
	18:	Dismantling, Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill (NH18)			
	18a:	Sand Blasting, Dismantling,			
		Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill (NH18a)			

DSA Development and Screening of Alternatives

Cost does not include ongoing activities described in Section 2.2.3 and listed in Table 9.4-4.

# Table 7.4-4 Cost Summary for Structures Remediation

Preferred Alternative	Mcdium Group	Present Worth Cost 1	Total Cost <sup>2</sup>
21a: Dismantline Salvage Consolidation	No Future Usc. Manufacturing History - Process History	\$30,900,00	\$31,600,000
21a: Dismantling, Salvage Consolidation	No Future Use, Manufacturing History - Non-Process History	\$10,600,000	\$10,800,000
18: Dismantling, Peroxide/Hypochlorite Treatment, On-Post Hazardous Waste Landfill	No Future Use, Agent History	\$122,000,000	\$125,000,000
	Subtotal Remediation Costs	\$164,000,000	\$167,000,000
Ongoing Actions/IRAs			
Asbestos Removal		\$55,000,000 (EST)	\$55,000,000 (EST)
Chemical Process Related Activities		\$40,000,000 (EST)	\$40,000,000 (EST)
Aboveground Storage Tank Removal		\$20,000,000 (EST)	\$20,000,000 (EST)
Underground Storage Tank Removal		\$10,000,000 (EST)	\$10,000,000 (EST)
PCB Removal		\$5,000,000 (EST)	\$5,000,000 (EST)
	Subtotal IRA/Ongoing Actions Cost	\$130,000,000 (EST)	\$130,000,000 (EST)
T	Total Estimated Remediation Cost for the Structures Medium	\$294,000,000	\$297,000,000

Present Worth Cost In 1995 Dollars
Total Cost In 1995 Dollars Does Not Include Present Worth Discount
Interim Remeidal Action
Polychlorinated Biphenyl
Estimated Cost 2 IRA PCB EST

# 10.0 REFERENCES CONSULTED

# RIC 84066RO1

- ACOE (U.S. Army Engineer District, Omaha Corps of Engineers). 1983, March. Evaluation of the existing and future flood potential on the Rocky Mountain Arsenal, Denver, CO. Prepared for: Rocky Mountain Arsenal.
- AGEISS. 1993 March. Draft Final Future Use Structures Monitoring Protocol Version 2.1. Contract No. DAAA05-92C-0815. Prepared for Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- AGEISS. 1993 March. Draft Final No Future Use Structures Sampling and Analysis Protocol Version 2.1. Control No. DAAA05-92C-0015. Prepared for Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 [SARA]). Public Law 99-499.
- DARCOM (U.S. Army Material, Development and Readiness Command). 1979. Safety Regulations for Chemical Agents H, HD, HT. DARCOM-R 385-31.

# RIC 89026R01

EBASCO. 1988b, September. Final Report Hazardous Waste Land Disposal Facility Assessment, Task 27. Prepared for Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.

# RIC 88357R02

EBASCO. 1988c, September. Draft Final Master Treatability Plan, Version 2.1. Contract No. DAAK11-84-D-0017. Prepared for Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.

# RIC 88306R02

EBASCO. 1988d, October. Final Structures Survey Report, Volumes I-III. Contract No. DAAK11-84-D-0017, Task No. 24. Prepared for Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.

# RIC 89166R05

EBASCO. 1989b, June. LTS RMA Final Remedial Investigation Report Volume IX North Plants Study Area Version 3.3, Volumes I-III.

# RIC 89166R04

- EBASCO. 1989e, July. LTS RMA Final Remedial Investigation Report Volume VIII South Plants Study Area Version 3.3, Volumes I-VI.
- EBASCO. 1990a, March. Final RIFS3 Work Plan, RMA On-Post Feasibility Study, Version 3.2, Contract No. DAAA15-88-0024. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- EBASCO. 1990b, May. Draft Final Human Health Exposure Assessment for Rocky Mountain Arsenal, Volumes I-VIII, Version 3.1. Contract No. DAAA15-88-D-0024. Prepared for U.S. Army Program Manager's Office for the Rocky Mountain Arsenal Contamination Cleanup.
- EPA (U.S. Environmental Protection Agency) Hazardous Waste Engineering Research Laboratory. 1985, March. Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites. EPA/600/2-85/028. PB 85-201234.
- EPA Office of Emergency and Remedial Response (OERR). 1988a, August 8. CERCLA Compliance with Other Laws Manual, Draft Guidance. OSWER Directive 9234.1-01.
- EPA OERR. 1988b, October. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. EPA/540/G-89/004. OSWER Directive 9355.3-01.

#### RIC 88203R01

ESE (Environmental Science and Engineering, Inc.) 1988a, April. Feasibility Study Technical Plan, Version 3.2. Contract No. DAAK11-84-D-0016, Task 28. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal.

# RIC 89068R01

- FFA (Federal Facility Agreement Pursuant to CERCLA Section 120). 1989. Docket No. CERCLA VIII-89-13.
- NCP (National Oil and Hazardous Substance Pollution Contingency Plan; Final Rule). 1990, March 8. 40 CFR Part 300.

# RIC 85022401

Nickens and Associates. 1984, May 14. An Archeological Overview and Management Plan for Rocky Mountain Arsenal, Adams County, Colorado. Prepared for U.S. Army Material Development and Readiness Command.

# RIC 89062R03

OHM (O.H. Materials Corporation). 1989, January 17. Asbestos Sampling Report for the Rocky Mountain Arsenal in Commerce City, Colorado.

# RIC 88131R01

PMRMA (Program Manager for Rocky Mountain Arsenal). 1988a, March. Final Technical Program Plan FY 88 - FY 92 (Remedial Investigation/Feasibility Study/Interim Response Actions), Volumes I and II.

# RIC 88329R02

PMRMA. 1988b, October. Final Decision Document for the Interim Response Action at the Rocky Mountain Arsenal Hydrazine Blending and Storage Facility.

# RIC 89019R01

PMRMA. 1988c, December. Final Decision Document for the Interim Response Action for Building 1727 Sump at Rocky Mountain Arsenal.

#### RIC 89222R02

PMRMA. 1989, July. Final Interim Response Action Technical Plan, Asbestos Removal - Phase II - Removal. Version 3.0.

RCRA (Resource Conversation and Recovery Act of 1976). Title 42 U.S.C.

# RIC 88340R02

RLSA (R.L. Stollar and Associates, Inc.). 1988, May. Biota Monitoring Technical Plan, Comprehensive Monitoring Program.

Settlement Agreement between the United States and Shell Oil Company concerning the Rocky Mountain Arsenal. 1989.

# RIC 81324R03

USAEHA (U.S. Army Environmental Hygiene Agency). 1978, October. Investigation of Pesticide Levels in Various Buildings at Rocky Mountain Arsenal.

USFWS (U.S. Fish and Wildlife Service). 1989, December. Bald Eagle Management Area Map.

Woodward-Clyde Consultants. 1993, March. Draft Final Future Use Structures Pilot Study Report Structures Feasibility Study Sampling and Analysis Version 2.0 Contract No. DAAA15-88-D-0022 Task 0005. Prepared for the Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.

Appendix A
Medium Group Structures Lists

# LIST OF TABLES

- Table A.1-1 Future Use, No Exposure
- Table A.1-2 No Future Use, Nonmanufacturing History
- Table A.1-3 No Future Use, Manufacturing History-Nonprocess History Subgroup
- Table A.1-4 No Future Use, Manufacturing History-Process History Subgroup
- Table A.1-5 No Future Use, Agent History
- Table A.1-6 Structures Removed Since 1986
- Table A.1-7 Remediation Use Structures

Table A	.1-1 F	uture Use, No Exposure		Page	1 of 2
Structu Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0105	#	Bus Shelter	0	0	33
0111		RMA Administration, Hqs, Offices	770	39000	35
0112		Communication Headquarters	290	2300	35
0120	#	Facilities Maintenance Headquarters	o	0	35
0121	#		o	0	35
0124	#		0	0	35
0129	#		0	0	35
0133	#		0	0	35
0135	#		o	0	04
0143		West Gate Guardhouse	23	180	04
0145		South Gate Guardhouse	46	170	11
0211	\$	Gas Meter House	21	240	02
0312		Fire Station Hqs	860	12000	36
0361	\$	Primary Electrical Substation	54	380	02
0362	\$	Warehouse	4000	59000	02
0370	#	Restroom	0	0	02
0371	\$	Water Pumping Station	820	1800	02
0372		Million Gallon Reservoir (Potable)	530	21000	02
0372A	\$	Chlorinator Station	56	380	02
0383		Community Club	340	6100	02
0618	\$	Warehouse	5300	110000	03
0619	\$	Warehouse	5200	110000	03
0702	#	Bald Eagle Observation Platform	o	0	05
NN0501		Abandoned School-fdn & wall	45	1300	05
NN0903		VORTAC Station	110	1000	09

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988) rev 06/21/93

Table A.1-1 Future Use, No Exposure

Page 2 of 2

Structure Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
Total:	25		18465	364850	

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)
rev 06/21/93

Table A.1-2 No	Future Use, Nonmanufacturing History		Page	1 of 5
Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0136	Garage-to 134-foundation	3	130	35
0137	Garage-to 131-foundation	3	130	35
0148	Storage/Pass Office-NW of 166	1	410	34
0150	Tennis Courts	120	13000	34
0169B	Gas Station House-fdn-S of 150	4	100	34
0176	5-Unit Garage & Unused Apt-fndation	24	1500	03
0368	Swimming Pool & Filter House	640	1900	02
0373	Officer's Quarters	130	1100	02
0373B	Garage-to 373	42	720	02
0383A	Officer's Club Storage	16	82	02
0635	Admin Offices-Rocky Mtn Railcar	48	590	03
0644	NCO Quarters-foundation	17	1400	03
0644A	Garage/Storage-foundation	1	40	03
0647A	Motor Pool Dispatch Office	35	1000	04
0680	Radio Range B-foundation	2	49	09
0685	Guard Tower-SE of 673-foundation	6	64	03
0688	Guard Tower-E of 615-foundation	6	64	03
0836	Air Force Seismic Monitoring	590	7100	24
0851	Pistol Range House	6	250	19
NN2401	Concrete Structure-E of Bog	3	25	24
ss 0100	Substation-1T-30'N of 866	o	0	06
ss 0101	Substation-2T-200'NE of 866	0	0	06
SS 0102	Substation-1T-500'W of 867A	0	0	06
SS 0103	Substation-1T-700'W of 865	o	0	06

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
ss 0104	Substation-1T-400'N of 872A	0	0	06
ss 0105	Substation-1T-NE of 867A	0	0	06
ss 0111	Substation-2T-N side 111	o	0	35
ss 0121	Substation-1T-NW corner of section	0	0	03
ss 0141	Substation-3T-E of 141	o	0	04
ss 0176	Substation-1T-W of Staff Quarters	0	0	03
ss 0370	Substation-1T-150'W of C	0	0	03
ss 0378	Substation-1T-N of 378	o	0	03
<b>ss</b> 0379	Substation-1T-SE of 379	o	0	03
ss 0385	Substation-3T-N of 385	o	0	04
ss 0386	Substation-3T-N of 386	o	0	04
ss 0387	Substation-3T-W of 387	o	0	04
ss 0391	Substation-3T-SE of 391	o	0	24
ss 0392	Substation-2T-W of 392	0	0	34
ss 0393	Substation-2T-S of 393	0	0	34
ss 0611	Substation-3T-S of 611	0	0	04
ss 0612	Substation-1T-E of 612	o	0	04
ss 0613	Substation-3T-NW of 613	o	0	04
ss 0614	Substation-1T-W of 614	0	0	03
ss 0616	Substation-3T-N of 614	o	0	03
ss 0618	Substation-3T-N of 618	o	0	03
ss 0618-2	Substation-IT-W of 618	o	0	03
ss 0619	Substation-4T-N of 619	o	0	03
SS 0622	Substation-1T-NE of 621	o	0	04

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
SS 0624	Substation-3T-E of 624	0	0	04
ss 0625	Substation-1T-E of 624	0	0	04
SS 0627	Substation-3T-E of 627	0	0	04
SS 0627A	Substation-1T-E of SS 627	o	0	04
ss 0629	Substation-3T-NE of 629	0	0	04
ss 0631	Substation-3T-N of 631	o	0	04
ss 0632	Substation-1T-NE of 632	0	0	04
ss 0633	Substation-3T-S of 633	0	0	04
ss 0634	Substation-3T-SE of 634	0	0	04
ss 0635	Substation-1T-W of 635	0	0	03
ss 0647	Substation-IT-E of 647A	0	0	03
ss 0673	Substation-1T-1200'NNE of 619	0	0	03
ss 0791-2	Substation-1T-E of 145	0	0	11
SS 0808ABC	Substation-3T-NE of 808	0	0	23
ss 0808D	Substation-1T-0.3 mi SW of 808	0	0	23
SS 0808E	Substation-1T-0.2 mi SW of 808	0	0	23
ss 0808F	Substation-1T-427'SSE of 808	0	0	24
ss 0808G	Substation-1T-800'SE of 808	0	0	24
ss 0808H	Substation-1T-0.36 mi ESE of 808	0	0	24
ss 0808I	Substation-1T-0.49 mi ESE of 808	0	0	24
ss 0808K	Substation-1T-0.68 mi ESE of 808	0	0	24
ss 0808L	Substation-1T-0.65 mi E of 808	0	0	24
ss 0809	Substation-3T-S of 809	o	0	33
SS 0809A	Substation-3T-300'SW of 809	0	0	33

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
SS 0809B	Substation-3T-200'W of 809	0	0	33
ss 0809C	Substation-3T-400'N of 809	0	0	33
SS 0809D	Substation-3T-700'NE of 809	0	0	33
SS 0809E	Substation-3T-500'E of 809	o	0	33
ss 0809F	Substation-3T-0.2 mi S of 809	o	0	33
ss 0831	Substation-3T-200'S of 8th & D St	0	0	35
SS 0831E	Substation-1T-538'SSE of 8th & D St	o	0	36
ss 0832	Substation-1T-300'E of 159	O	0	34
ss 0836	Substation-3T-S of 836	0	0	24
ss 1730	Substation-2T-NW of 1730	o	0	31
ss 1731	Substation-1T-200'NW of 1730	o	0	31
ss 1732	Substation-IT-NW corner of section	0	0	31
ss 1735	Substation-3T-E of 1736	0	0	31
ss 1736	Substation-2T-200'S of 1736	0	0	31
SS AL338	Substation-IT-SE corner of section	0	0	31
SS FL842 T	Substation-1T-N of 1618	0	0	25
SS NN2201	Substation-1T-640'NNW of 810	0	0	22
SS NN2202	Substation-1T-960'NNW of 810	0	0	22
SS NN2203	Substation-1T-1260'NW of 810	0	0	22
SS NN2204	Substation-lT-1600'NW of 810	0	0	22
SS NN2205	Substation-1T-2050'NW of 810	0	0	22
SS NN2206	Substation-1T-2500'NW of 810	o	0	22
SS NN2207	Substation-1T-800'WNW of 810	o	0	22
SS NN2208	Substation-1T-1100'WNW of 810	0	0	22

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-2 No Future Use, Nonmanufacturing History			Page	5 of 5
Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
SS NN2209	Substation-1T-1350'WNW of 810	0	0	22
SS NN2210	Substation-1T-1670'WNW of 810	0	0	22
SS NN2211	Substation-1T-2370'WNW of 810	0	0	22
SS NN2301	Substation-3T-200'N of 808	0	0	23
SS NN2501 T	Substation-IT-SE corner of 1602	0	0	25
SS NN2601	Substation-1T-S of 806	0	0	26
SS NN2701	Substation-3T-W of 810	0	0	27

1697 29654

Total: 103

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0112A \$	Emergency Generator Plant	35	240	35
0112B	BBQ-N of 112	2	16	35
0114	Security Incinerator	8	34	35
0116	Bus Stop Shelter	4	140	01
0132 #\$	Shell/MKE Fiedl Headquarters	. 0	0	35
0245	Substation Building	23	210	02
0282	Guard Station-fndtn-NW of NN0102	7	64	01
0286	Guard Station-SE of 557-foundation	6	64	01
0287	Guard Tower-foundation	6	64	01
0291	Guard Station-foundatn-735'W of 362	6	64	02
0295	Guard Tower-SE of 112-foundation	6	64	02
0296	Guard Tower-foundation	<b>6</b>	64	02
0307	Potable Water Valve & Meter Pit	11	130	36
0309	Maintainence/Storage-S of 545	10	420	01
0311 \$	Sterns-Rogers Office/Sample Storage	350	4400	02
0315A \$	Steam Meter Pit-W of 315	7	100	01
0316	Plants Dispensary/Clinic	240	3200	01
0316	Wood Shed-W of 727	2	100	01
0317A	Pipe Shop/Grease Pit	48	2600	01
0321D \$	Fuel Oil Pumphouse	38	480	02
0322	Coal Sampling Building	30	340	02
0322A	Tractor Storage Shed	34	410	02
0323	Ash (Coal) Storage Silo-Hopper	350	500	02

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Structur Number	e	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0324		Coal Hopper Structure	6	160	02
0325		Electrical Power Plant	3100	12000	02
0327		Cafeteria-foundation	29	1600	02
0328A		Toilet House	15	130	02
0334	\$	Warehouse	980	11000	02
0337		Locker Room/Change House	57	590	02
0341		Change House	1000	12000	02
0341A	\$	Condensate Pump House	15	160	02
0341B		Sewage Lift Station-covered pit	8	71	02
0342		Warehouse/M74 I. B. Storage	1000	13000	02
0343A		Flammable Materials Storehouse	29	240	02
0344		MFG Assembly/Warehouse	1200	11000	02
0345		Mfg Assembly/Storage/Warehouse	1000	11000	02
0346	\$	Warehouse	920	11000	02
0351		Change House	920	9000	02
0354		Warehouse	1000	12000	02
0364		Sewage Lift Station-SE of 354	21	85	02
0392	\$	Sewage Lift Station	46	260	34
0393	\$	Sewage Lift Station	46	260	34
0394		West Gate Sewage Treatment Plant	3	140	33
0395		Toxic Yard Sewage Plant-NW of 867B	7	88	06
0409		Condensate Pump House	4	130	01
0432		Sand Blasting Pad/Change House-fdn	180	9200	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Structu Number	ire	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0459C		Small Building-N of 459	6	140	01
0464		Sample Building	2	55	01
0471C		TC Refrigeration	66	730	01
0474		Electrical Control House	16	80	01
0504A		DET Maintenance Shop/Storage	45	840	01
0516B	T	Misc Electrical Equipment Storage	34	210	01
0517		Offices/Change House/Laboratory	1300	18000	01
0520		Sample Pump/pH Probes Storehouse	1	36	01
0521C		Lunchroom/Field Foreman Office	41	640	01
0522B		Change House/Administration Bldg	420	5100	01
0525A		Refrig Compressor/Electrical Vault	31	440	01
0527	T	Change House/Quonset Hut	16	1000	01
0538A	T	Compressor Building	67	690	01
0539	T	Electrical Substation Builiding	17	430	01
0541A		Magazine	9	88	01
0543B	\$	Facilities Engineers	590	8700	01
0546		Sewage Lift Station	12	72	01
0548		Water Pumping Station	370	2300	01
0549		Reservoir and Cooling Tower	630	4500	01
0550		Lift Station	6	280	01
0551	\$+	Elevated Storage Tank	620	0	01
0552	\$	Valve Pit	55	310	01
0553		Vault	8	64	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structur Number	e	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0555	T	Guardhouse/Gas Mask Training(TW-14)	5	210	01
0571A		Electrical Vault	21	85	01
0605		Flammable Materials Storehouse	2	170	03
0606		Flammable Materials Storehouse-fdn	1	170	03
0607		Flammable Materials Storehouse	2	210	03
0608		Flammable Materials Storehouse	2	210	03
0611		Data Processing Building	440	4600	04
0612		Courier Building	240	5100	04
0613		Management Information Systems	480	6500	04
0621A	\$	Truck Scale Platform	56	740	04
0623		Carpenter Shop/Hobby Shop/Auto Shop	230	4200	04
0626		Machine and Welding Shop-foundation	100	6000	04
0629E		Service Station Shelter	35	25	04
0630	\$	Gas Meter House	37	240	03
0639		Lumber Storage	94	4500	04
0641		Warehouse-foundation	95	900	03
0647B		Motor Pool Vehicle Storage	100	9600	04
0647C		Motor Pool Vehicle Storage	29	3000	04
0647D		Motor Pool Vehicle Storage	29	3000	04
0648		Road Oil Pump and Boiler House	56	350	04
0673	\$	Railcar Scale House	2	88	03
0684		Guard Tower-E of 644, N of 675-fndn	6	64	03
0731		Reserve Center/Office/Change House	770	12000	01

<sup>\$ -</sup> Remediation Use Structure

rev 06/21/93

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu Number	ire	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0733A		Magazine	34	400	01
0733B		Magazine	34	400	01
0733F		General Purpose Magazine	69	400	01
0745		Fire Fighting Manifolds for 745ABC	21	24	01
0752		Carpenter Shop/Storage	610	4900	01
0752A		Lumber Storage	110	1000	01
0754	T	Lumber Storage	49	840	01
0784		Guard Station-SE of 742-foundation	6	64	01
0801	T\$	Radio Relay Station-N of 1726	12	180	25
0831	\$	Technical Escort/Officer's Quarters	120	1100	35
0831A	\$	Garage/Storage Shed	27	360	35
0833		Lumber Storage Shed	82	580	35
0840	#\$	Air Monitoring Station	0	0	25
0841		CO Public Service Co Meter House	82	200	12
0853		Observation Pit/Mortar Range	94	2000	30
0854		Concrete Wall	12	200	26
0863		Target Range House	5	260	12
0864		General Storehouse	10	400	06
0865		Warehouse	41	1000	06
0866	\$	Toxic Yard Office & Change House	140	2400	06
0867A		Toxic Yard Metal and Wood Shop	67	1600	06
0871A		Magazine	66	600	06
0871B		Magazine	66	600	06

<sup>\$ -</sup> Remediation Use Structure

rev 06/21/93

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu Number	ıre	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0871C		Magazine	66	600	06
0871D		Magazine	86	800	06
0872A		Magazine	86	800	06
0872B		Magazine	86	800	06
0872C		Magazine	86	800	06
0872D		Magazine	86	800	06
0873A		Magazine	86	800	06
0873В		Magazine	86	800	06
0873C		Magazine	86	800	06
0874B		Magazine	86	800	06
0874C		Magazine	86	800	06
0874D		Magazine	86	800	06
1504A	T	Monitoring Shed	7	220	25
1505A	T	Sentry Station	2	85	25
1510A	T	Fire Apparatus Buildng/Foam Storage	16	130	25
1512	T	Sentry Station/Gate House	18	130	25
1611A	T	Sentry Station	4	84	25
1619		Administration Building-N o'N Plant	8	320	25
1622		General Storehouse-N of North Plant	34	970	25
1705	T	Instruction Building/Cafeteria	250	4000	25
1706	T	Sentry Station/Gatehouse	44	360	25
1707	T	Cooling Tower	560	2800	25
1710	T\$	Clinic and Administration Building	920	15000	25

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
1713 T\$	Standby Generator Plant	100	2500	25
1719 T\$	Electrical Distribution System	13	130	25
1728 T+	Potable Water Tank	69	0	25
1730	Guardhouse	13	110	31
1734	Change House	48	470	31
F 40007 T+	Horizontal Tank-TF2501	1	0	25
F 50117 T+	Vertical Tank-TF2501	7	0	25
F 50120 T+	Vertical Tank-TF2501	7	0	25
F 50123 T+	Vertical Tank-TF2501	7	0	25
F 50393 T+	Vertical Tank-TF2501	5	0	25
F 50394 T+	Vertical Tank-TF2501	3	0	25
F 50670 T+	Vertical Tank-TF2501	2	0	25
F 58987 T+	Horizontal Tank-TF2501	5	0	25
G 50830 T+	Vertical Tank-TF2501	1	0	25
G 50831 T+	Vertical Tank-TF2501	1	0	25
NN0101	Valve Gate-W side of Upper Derby	20	49	01
NN0102	Foundation-N of 534B	19	750	01
NN0103	Bathroom-N of 533	3	120	01
NN0104	Flare Tower-N of 571B, NW of 571	17	660	01
NN0105	Gas Meter House-SW of 508	5	200	01
NN0107	Metal Shed-W of 733B	1	310	01
NN0108	Metal Shed-W of 733C	1	310	01
NN0109	Guard Station-NE of 732	1	64	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
NN0110	Metal Shed-S of 521B	3	80	01
NN0111	Three Metal Incinerator-NW of 541	150	440	01
NNO112 T	Stack Observation Station-E of 527	12	280	01
NN0113	2 Metal Sheds-S of 474 SS	27	250	01
NN0114	Wooden Hut-SW of 461	2	22	01
NN0115	Flare Tower-N of Lime Pond	17	660	01
NN0116	Long Metal Shed-S of 544	47	6000	01
NN0117	2 Sheds-SW of 557	4	130	01
NN0201	Concrete Silo-NW of 254	350	1300	02
NN0202	Brick Structure-E of SS 361	15	140	02
NN0203	Fire Equipment Storage-SW of 254	29	80	02
NN0204	Coal Hopper foundation-N of 334	38	1100	02
NN0205	Brick Valve House-S of 321B	27	150	02
NN0301	Metal Shed-N of 618	1	410	03
NN0302	Metal Shed-N of 618	1	410	03
NN0303	Metal Shed-N of 619	1	2400	03
NN0304	Metal Shed-N of 619	1	1900	03
NN0601	Loading Dock-W of 866	150	11000	06
NN0602	Long Metal Shed-W of 865	1	3500	06
NN0603	Metal Shed-E of 867A	1	510	06
NN0902 \$	Survey Tower-N of Post Office	1	140	09
NN1208	Brick Structure-900'SW of 846	9	81	12
NN1209	Concrete Bunker-1100'S of 846	14	68	12

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
NN1210	Concrete Bunker-1250'S of 846	10	56	12
NN1211	Concrete Bunker-1300'S of 846	14	68	12
NN1212	Concrete Bunker-1350'S of 846	6	64	12
NN1213	AMSA/OMS Maintenance Shop-N of 841	780	10000	12
NN2001	Antenna Installation-1/2 mi N o'9th	17	44	20
NN2002 \$	Tank Pad-N of 9th, 2/3 mi E of F St	14	380	20
NN2301	Abandoned Water Purification Plant	60	1600	23
NN2402	Wooden Shed-N of Trickling Filters	7	170	24
NN2403	2 Trickling Filters-S of 391	1800	17000	24
NN2404	Imhoff Tank-S of 391	410	2800	24
NN2405	Antenna Installation-N of 836	12	44	24
NN2501	Shed-NW of 1618	8	300	25
NN2502	Gas Pump & Pad-NE of 1618	32	950	25
NN2503 T	Pumping Station-S of 1510	4	72	25
NN2601	Decon Pad/Tank-NE of Basin F	58	2300	26
NN2602	Valve gate-N end of Reservoir C	19	56	26
NN3001	Metal Shed-E of 853	1	580	30
NN3002	Metal Shed-E of 853	1	580	30
NN3101	Metal Shed-N of 1734	1	80	31
NN3102	3 Sets Shed Siding-1100'SE of 1735	2400	59000	31
ทห3103	Storage Bldg-Toxic Storage Yard	1	1500	31
NN3104	Shack-W of Berms-Toxic Storage Yard	1	70	31
NN3105	Shed-NW End of Berms-Toxic Storg Yd	1	110	31

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
NN3106	Shed-NE End Berms-Toxic Storage Yd	2	4000	31
NN3107	Antenna Station-Toxic Storage Yard	4	32	31
NN3108	Shed-SW End of 1st Berm-Toxic Yard	1	110	31
NN3109	Shed-SE End of 1st Berm-Toxic Yard	2	4000	31
NN3501	3 Communications Antenna Pits	6	48	35
NN3601	Incinerator-500'NE of 834	30	350	36
NN3602	Incinerator-1000'SE of 834	6	100	36
NN3603	Metal Shed-NW of 725	4	140	36
NN3604	Metal Shed-SW of 725	6	200	36
NN3605	Metal Shed-SE of 725	2	200	36
NNT0101 +	Vertical Tank-TF0101	21	0	01
NNT0103 +	Vertical Tank-TF0106	1	0	01
NNT0105 +	Horizontal Tank-TF0108	1	0	01
NNT0106 +	Vertical Tank-TF0109	2	0	01
NNT0107 +	Horizontal Tank-E of 471C	1	0	01
NNT0108 +	Horizontal Tank-E of 314	1	O	01
NNT0110 +	Horizontal Tank-E of 536	1	o	01
NNT0111 +	Vertical Tank-TF0105	5	0	01
NNT0201 +	Undrground Oil Tank w/DCPD-W of 321	1	o	02
R 0019 +	Vertical Tank-TF0109-on fdn 426	1	0	01
R 0038 +	Vertical Tank-TF0106	4	0	01
ss 0112	Substation-1T-150'S of 112	o	0	02
SS 0213	Substation-3T-SE of 213	o	0	02

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History
Nonprocess History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
ss 0232	Substation-3T-SW of 254	0	0	02
SS 0243	Substation-1T-W of 243	0	0	02
SS 0245	Substation-3T-S of 245	o	0	02
ss 0311	Substation-1T-S of 311	0	0	02
ss 0312	Substation-IT-S of 312	0	0	01
ss 0313	Substation-3T-W of 313	0	0	01
ss 0313-2	Substation-3T-W of 313	0	0	01
ss 0315	Substation-3T-SW of 315	0	0	01
ss 0316	Substation-1T-S of 316	0	0	01
SS 0316A	Substation-3T-S of 316A	0	0	01
ss 0317	Substation-1T-NW of 433	0	0	01
SS 0321A	Substation-3T-SW of 242	0	0	02
SS 0321B	Substation-1T-SE of 242	0	0	02
SS 0325	Substation-14T-between 325 & 311	0	0	02
ss 0327	Substation-3T-W of 332	o	O	02
ss 0328	Substation-3T-N of 328	0	o	02
ss 0330	Substation-1T-SW of 337	0	0	02
ss 0335	Substation-3T-S of 336	0	0	02
SS 0342	Substation-3T-ENE of 342	0	0	02
SS 0344	Substation-5T-E of 344	0	O	02
ss 0355	Substation-3T-E of 356	o	0	02
ss 0365	Substation-3T-N of 365	o	0	02
ss 0368	Substation-1T-1/4 mi SSE of 351	O	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
ss 0371	Substation-10T-N of 371	0	0	02
SS 0371A	Substation-1T-S of 372	0	o	02
SS 0371B	Substation-1T-N of SS 371	0	0	02
ss 0383	Substation-3T-E of 383	0	O	02
SS 0411	Substation-3T-NE of 411	0	0	01
SS 0422	Substation-3T-W of 422	0	0	01
SS 0451	Substation-1T-SE of 413	O	o	01
SS 0461	Substation-2T-S of 459	0	o	01
SS 0464	Substation-2T-SE of 464	0	0	01
SS 0510	Substation-3T-SE of 510	0	0	01
SS 0512	Substation-3T-NW of 517	0	0	01
SS 0514	Substation-3T-200'E of 561	0	O	01
SS 0516	Substation-3T-W of 519	0	o	01
ss 0517	Substation-2T-NW of 517	0	0	01
SS 0517A	Substation-3T-N of 512	0	0	01
SS 0517B	Substation-3T-SW corner of 517	o	o	01
ss 0521	Substation-3T-SW of 521	o	o	01
SS 0523	Substation-3T-S of 803	o	o	26
SS 0525A	Substation-1T-SW of 525	o	o	01
SS 0527	Substation-1T-S of 527	o	0	01
ss 0531	Substation-1T-W of 531	o	0	01
SS 0534	Substation-3T-200'N of 534A	o	0	01
ss 0539	Substation-2T-SE of 537	o	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
SS 0541	Substation-3T-W of 541	0	0	01
SS 0543	Substation-5T-W of 543	0	0	01
SS 0548	Substation-1T-N of 548	0	0	01
SS 0548A	Substation-1T-101'W of 548	0	0	01
ss 0556	Substation-1T-N of 541	0	0	01
SS 0575	Substation-1T-N of 504	0	0	01
SS 0575A	Substation-1T-N of 505	0	0	01
SS 0726	Substation-3T-200'S of 725	0	0	36
<b>s</b> s 0728	Substation-3T-E of 728	0	0	01
SS 0729	Substation-6T-E of 729	0	0	01
SS 0732	Substation-6T-S of 732	0	0	01
SS 0742	Substation-6T-N of 742	0	0	01
SS 0747	Substation-1T-75'S of 729	0	0	01
<b>S</b> S 0756	Substation-IT-W of 868C	0	0	01
<b>ss</b> 0757	Substation-1T-S of 463D	0	0	01
ss 0780	Substation-1T-N of T 1505	0	0	01
ss 0781	Substation-1T-NE of T 1507	0	0	01
SS 0806D	Substation-1T-SE of 806	0	0	26
SS 0806G	Substation-1T-0.25 mi SW of 9 & D	0	0	26
SS 1402 T	Substation-3T-150'W of 1601/1701	0	0	25
SS 1403 T	Substation-3T-S of 1701	0	0	25
SS 1404 T	Substation-3T-130'S of 1501	0	0	25
SS 1501 T	Substation-7T-SE of 1501	0	0	25

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
SS 1505 T	Substation-3T-E of 1505	0	0	25
SS 1506 T	Substation-2T-NW corner of 1506	o	0	25
SS 1510 T	Substation-2T-150'W of 1601	0	0	25
ss 1601-1 T	Substation-lT-E of 1601	o	0	25
SS 1601-2 T	Substation-IT-E of 1601	0	O	25
SS 1602 T	Substation-2T-100'SE of 1606	0	o	25
SS 1603 T	Substation-3T-100'NE of 1602	0	0	25
SS 1605 T	Substation-1T-between 1605 & 1608	0	o	25
SS 1606-1 T	Substation-3T-100'E of 1606	o	0	25
SS 1606-2 T	Substation-lT-100'NE of 1606	0	0	25
SS 1607 T	Substation-3T-100'E of 1607	0	o	25
SS 1609 T	Substation-1T-150'NE of 1609	0	О	25
SS 1611 T	Substation-IT-E of 1611	0	o	25
SS 1611AB T	Substation-2T-S of 1611	o	o	25
SS 1614 T	Substation-2T-NE 0'1615	0	o	25
SS 1616 T	Substation-2T-NE of 1616	0	o	25
SS 1701 T	Substation-3T-100'E of 1701	o	О	25
SS 1702 T	Substation-2T-W of 1702	o	o	25
SS 1703 T	Substation-IT-S of 1703	0	o	25
SS 1704-1 T	Substation-3T-E of 1704	•	o	25
SS 1704-2 T	Substation-2T-E of 1704	0	0	25
SS 1704-3 T	Substation-3T-E of 1704	o	0	25
SS 1706 T	Substation-1T-N of 1706	o	0	25

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
SS 1707 T	Substation-1T-S of 1704	0	0	25
ss 1710 T	Substation-3T-100'E of 1710	0	0	25
SS 1711 T	Substation-3T-100'E of 1706	0	0	25
SS 1724 T	Substation-3T-200'N of 1706	o	0	25
ss 6C	Substation-1T-SW corner of section	0	0	02
ss 7c	Substation-1T-112'ESE 7th & C	0	0	02
SS AWL021	Substation-IT-S of pool rd	0	0	02
SS CPR 1	Rectifier-1R-130'SSE of 254	0	0	02
SS CPR 10	Rectifier-1R-S of 742A	0	0	01
SS CPR 2	Rectifier-1R-W of 313	0	0	01
SS CPR 3	Rectifier-1R-146'W of 326	0	0	02
SS CPR 4	Rectifier-1R-E of 352A	0	0	02
SS CPR 5	Rectifier-1R-with SS 514	0	0	01
SS CPR 7	Rectifier-1R-NE of SS 411	0	0	01
SS CPR 8	Rectifier-1R-W of 433	0	0	01
SS CPR 9	Rectifier-1R-W of 542	0	0	01
SS GA	Substation-1T-0.1 mi N of 732	0	0	36
SS LDLA	Substation-1T-W of Lower Derby	0	0	01
SS SBA	Substation-3T-SE side of 834	0	0	36
SS SWIM	Substation-1T-W of pool/on C	0	0	02
T 0026 +	Horizontal Tank-TF0107	1	0	01
T 0032 +	Horizontal Tank-TF0109-on fdn 426	1	0	01
T 0064 +	Horizontal Tank-TF0107	1	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structu: Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
T 0066	+	Vertical Tank-TF0103	38	0	01
T 0075	+	Vertical Tank-TF0103	1	0	01
T 0076	+	Vertical Tank-TF0103	1	0	01
T 0077	+	Vertical Tank-TF0103	1	0	01
T 0078	+	Vertical Tank-TF0103	1	0	01
T 0079	+	Vertical Tank-TF0103	1	0	01
T 0080	+	Vertical Tank-TF0103	1	0	01
T 0081	+	Vertical Tank-TF0103	2	0	01
T 0082	+	Vertical Tank-TF0103	2	0	01
T 0130	+	Horizontal Tank-TF0109	1	0	01
T 0131	+	Horizontal Tank-TF0109	1	0	01
T 0132	+	Horizontal Tank-TF0109	1	0	01
T 0133	+	Horizontal Tank-TF0109	1	0	01
T 0139	+	Horizontal Tank-TF0107	1	0	01
T 0190	+	Horizontal Tank-TF0107	3	0	01
T 0208	+	Vertical Tank-TF0109	6	0	01
T 0273	+	Horizontal Tank-TF0109	9	o	01
T 0289	+	Air Receiver/Surge Tank-NE of 516	1	o	01
T 1040	+	Vertical Tank-TF0107	1	o	01
T 1048	+	Vertical Tank-TF0109	1	o	01
T 1124	+	Vertical Tank-TF0103	1	o	01
T 1127	+	Vertical Tank-TF0110	7	0	01
т 1134	+	Vertical Tank-TF0110	3	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Table A.1-3 No Future Use, Manufacturing History
Nonprocess History Subgroup

Structum Number	ce	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
T 1142	+	Horizontal Tank-TF0109	2	0	01
T 1171	+	Horizontal Tank-TF0110	1	o	01
T 1173	+	Horizontal Tank-TF0110	1	О	01
T 1215	+	Vertical Tank-TF0110	3	0	01
T 1272	+	Vertical Tank-TF0103	15	o	01
T 1290	+	Vertical Tank-TF0108	4	0	01
T 1305	+	Water Surge Tank-TF0108	4	o	01
T 1307	+	Vertical Tank-TF0108	2	0	01
T 1327	+	Vertical Tank-TF0103	17	0	01
T 1392	+	Vertical Tank-E of 512	5	o	01
T 1446	+	Horizontal Tank-TF0103	1	o	01
T. 1463	+	Vertical Tank-TF0104	2	0	01
T 1507	+	Quench Water Tank-TF0105	86	o	01
T 1508	+	Qench Water Tank-TF0105	81	o	01
T 1570	+	Vertical Tank-TF0105	5	o	01
T 1606	+	Horizontal Tank-TF0109	5	О	01
T 1973	+	Vertical Tank-TF0103	2	o	01
<b>TF</b> 0101	+	Planavin Tank Farm-N of 534B	200	О	01
TF0102	+-	515 Tank Farm-E of 534	200	0	01
TF0103	+	BCH Tank Farm-W of 514D	120	0	01
TF0104	+	514 Tank Farm-N of 509	370	0	01
<b>TF0105</b>	+	DET System Tank Farm-N of 728	790	0	01
<b>TF</b> 0106	+	Tank Farm-NE of 515	57	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-3 No Future Use, Manufacturing History Nonprocess History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
TF0107 +	Tank Farm-W & S of 514A	110	0	01
TF0108 +	Tank Farm-N of & btwn 525 & 521	200	o	01
TF0109 +	Tank Farm-surrounding 471	360	0	01
TF0110 +	471 Tank Farm-S of 472A	200	0	01
TF2501 T+	Tank Farm-W of 1704	, 25	0	25
TW-13 T	Open Storage-foundation-N of 1611	120	5800	25
V 1064 +	Vertical Tank-TF0109	1	o	01
V 1147 +	Horizontal Tank-TF0103	1	0	01
V 1214 +	Vertical Tank-TF0106	2	o	01
V 1230 +	Horizontal Tank-TF0102	1	0	01
V 1250 +	Horizontal Tank-TF0104	1	o	01
V 1253 +	Horizontal Tank-TF0104	1	0	01
V 1254A +	Methyl Chloride Tank-TF0104	1	0	01
V 1254B +	Horizontal Tank-TF0104	1	O	01
V 1259 +	DET Wastewater Storage Tank-TF0105	11	0	01
V 1265 +	Horizontal Tank-TF0105	91	О	01
V 1270 +	Horizontal Tank-TF0105	1	0	01
V 1313 +	Horizontal Tank-TF0105	30	o	01
z-28 #\$		o	o	23
z-3 #\$		o	0	35
z-36 #\$		0	0	01
z-38 #\$		o	0	04
<b>z-</b> 39 #\$		0	o	04

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
z-40	<b>#</b> \$		0	0	25
z-41	<b>#</b> \$		0	0	25
z-42	<b>#</b> \$		0	0	25
z-56	<b>#</b> \$		0	0	35
z-57	<b>#</b> \$		0	0	35
z-58	<b>#</b> \$		0	0	35
z-68	<b>#</b> \$		0	0	35
z-69	<b>#</b> \$		0	0	35
<b>z-</b> 70	<b>#</b> \$		0	0	04
al:	423		34868	438020	

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section	
0130	#\$		0	0	35	
0213		Calibration Facility/X Ray Lab	680	4600	02	
0241		Administration/Lab/Change House	290	3000	02	
0242		Chlorine Production/US Mint Storage	3100	42000	02	
0243		Chlorine Production Compressor Bldg	1000	9200	02	
0244		3 Liquid Chlorine Tank Saddles	30	200	02	
0246		HCl Production Facility	56	1600	02	
0247		Salt Storage Building & foundation	1100	58000	02	
0248		Brine Treatment Plant-foundation	180	4200	02	
0249		Brine Storage & Pump House-foundatn	260	9300	02	
0251		Chlorine Evaporator/Storage	1100	23000	02	
0252		Cell Liquor Storage-foundation	29	2900	02	
0253		50% NaOH Storage-foundation	36	4500	02	
0254		Caustic Fusion Plant/Drum Storage	1200	16000	02	
0255		Fuel Oil Pump Station & 2 tank pads	23	300	02	
0256		Fuel Oil Tank-SE corner of 254	6	65	02	
0313A		Sewage Pump Station	3	38	01	
0314		Fixed Laundry Service Building	770	8600	01	
0316A		Morrison-Knudsen/Change House	340	5100	01	
0317		Vehicle Maintenance/Storage/Offices	450	11000	01	
0318	#\$		0	0	35	
0321	\$	Boiler Plant-Central Gas Heat Plant	6000	56000	02	
0321A	\$+	Tank	4	0	02	

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Structur Number	e	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0321B	+	Fuel Oil Tank-SE of 321C	4	0	02
0321C	\$	Pumphouse	37	580	02
0321E	+	Fuel Oil Storage Tank	12	0	02
0326		Power Plant Pumphouse & Spray Pond	720	15000	02
0328		Goop Mixing and Filling Building	2300	16000	02
0329		Gasoline Pump Building	46	400	02
0331	\$	Phosgene Filling Warehouse	1000	12000	02
0332	\$	Warehouse	1000	12000	02
0333	\$	Warehouse	980	11000	02
0335	\$	Warehouse	990	11000	02
0336	\$	General Purpose Warehouse	990	11000	02
0338		Storage Magazine	12	54	02
0339		Storage Magazine	14	54	02
0340		Magazine	14	54	02
0343		Manuf. BldgPreClustering Warehous	1000	11000	02
0347	\$	Warehouse/Chemical Storage	1900	27000	02
0352		Open Storage-foundation	250	12000	02
0352A		Quonset Storage	19	970	02
0353		Open Storage-foundation	760	13000	02
0355		Warehouse	1000	13000	02
0356		Warehouse	1000	13000	02
0365		Explosive Blending Building	490	3200	02
0369	\$	Lower Derby Valve Gate	20	49	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0374		Water Treatmnt Plt-W o'Lr Derby-fdn	110	- 890	02
0378	\$	Chlorinating Station (on airport)	16	150	10
0379	\$	Chlorinating Station	20	210	03
0381	#\$	•	o	0	02
0382		Chlorinating Station	7	56	03
0385	\$	Water Pump Station	14	140	04
0386	\$	Water Pump Station	14	140	04
0387	\$	Water Pump Station	14	140	04
0391		Sewage Disposal & Treatment Plant	88	1100	24
0411		SM & SD Manufacturing/Storage	1500	16000	01
0411A		Steam Meter House	6	72	01
0411B		Steam Meter House	4	64	01
0413		WP Storage/SM Storage	670	5500	01
0413A	+	Phossy Water Tank-W of 413	120	0	01
0415		Caustic Makeup Tank-foundation	79	290	01
0424A		Mustard Scrubber-foundation	10	720	01
0424C		Aldrin Filter Building-foundation	16	750	01
0433		Ethylene Generator/R&D Office	2900	29000	01
0434	+	West Gas Holder	730	0	01
0435	+	East Gas Holder	720	0	01
0451		Warehouse/Production Filling	900	11000	01
0459		Acetylene Generator Building	229	3200	01
0459A		Lime Slurry Pumphouse	24	81	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0459B		Lime Slurry Pumphouse	36	170	01
0461		Tank Farm Pumphouse	51	430	01
0462A	+	Fuel Oil Storage Tank	1700	0	01
0463A	+	Storage Tank	1000	0	01
0463B	+	Storage Tank	1000	0	01
0463C	+	DCPD/Alcohol Storage Tank	920	0	01
0463F	+	Storage Tank	1000	0	01
0463G	+	Storage Tank	1000	0	01
0463н	+	Storage Tank	1000	0	01
0464A	+	Storage Tank	11000	0	01
0464B	+	Storage Tank	11000	0	01
0471		TC Reactor/Pesticide Production	580	5100	01
0471B		Electrical Vault	9	160	01
0472		TC Refrigeration	110	1200	01
0472A		Lunchroom/Maintainence Equipmt Stor	24	320	01
0473		TC Drum Loading/Pesticide Packaging	86	1900	01
0475		Railroad Car Warmer Shed	180	980	01
0502		West Chemical Metering Pump	41	700	01
0503		East Chemical Metering Pump	37	290	01
0504		DET Emergency Diesel Generator	31	330	01
0505		DET Pretreatment Feed Pump House	30	510	01
0506		DET Control House	68	830	01
0507		DET Separator Pumphouse	41	520	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0508	DET Copper Sulfate Treatment	160	4700	01
0509	DET Methyl Cl Compressor/Liquifier	69	430	01
0510	Methyl Isocyanate Refrigeration	28	300	01
0511	Chlorinated Paraffin Mfg./Storage	2500	23000	01
0511A	Chlorinated Paraffin/Change House	160	1700	01
0512A T	Flammable Solvent Storage Shed	7	250	01
0514C	Pump House	1	96	01
0514D	Refrigeration Compressor	13	200	01
0514E	Monomethylamine Dilution Control	4	92	01
0515	CP/DDT/Pesticide Production	1600	15000	01
0515A	Nudrin/Endrin Storage	202	1900	01
0518A \$	Emergency Fire Protection Generator	22	290	01
0519	Hydrogen Peroxide Storage	82	290	01
0519A	Hydrogen Peroxide Pumphouse	4	160	01
0521	Acetylene Compressor/Pesticide Mfg.	220	1100	01
0521A	Refrigeration/DCPD Cracking	36	320	01
0521B	Compressor House/Maintainence	93	670	01
0522	WP Cup Filling/Acetylene Mfg	890	9400	01
0522A +	Phossy Water Tank	17	112	01
0523	AT Mfg. Bldg./Igniter Tube Filling	300	4000	01
0523A	WP Storage Tank House	140	1500	01
0523C	Arsenic Trioxide Dry Storage Silo	71	210	01
0523D	Arsenic Trioxide Dry Storage Silo	96	360	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

0523E       Arsenic Trioxide Dry Storage Silo       96       360       01         0523F       Arsenic Trioxide Dry Storage Silo       96       360       01         0523G       Arsenic Trioxide Dry Storage Silo       96       360       01         0524       WP Filling Building-fndatn       27       1400       01         0525       Product Dvlpmt Lab/Nudrin Mfg.       380       8100       01         0526       Pesticide Filter-foundation       26       900       01         0529       T       NaOH Make Up/Azodrin Support Struct       87       750       01         0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534B       Planavin Manufacture       470       13000       01         0534C       Emergency Generator/Electric Vault       27       210       01
0523G       Arsenic Trioxide Dry Storage Silo       96       360       01         0524       WP Filling Building-fndatn       27       1400       01         0525       Product Dvlpmt Lab/Nudrin Mfg.       380       8100       01         0526       Pesticide Filter-foundation       26       900       01         0529       T       NaOH Make Up/Azodrin Support Struct       87       750       01         0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0524       WP Filling Building-fndatn       27       1400       01         0525       Product Dvlpmt Lab/Nudrin Mfg.       380       8100       01         0526       Pesticide Filter-foundation       26       900       01         0529       T       NaOH Make Up/Azodrin Support Struct       87       750       01         0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0525       Product Dvlpmt Lab/Nudrin Mfg.       380       8100       01         0526       Pesticide Filter-foundation       26       900       01         0529       T       NaOH Make Up/Azodrin Support Struct       87       750       01         0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0526       Pesticide Filter-foundation       26       900       01         0529       T       NaOH Make Up/Azodrin Support Struct       87       750       01         0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0529       T       NaOH Make Up/Azodrin Support Struct       87       750       01         0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0531       Warehouse       970       11000       01         0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0532       Pesticide Storage/Warehouse       1100       12000       01         0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0533       Flammable Materials Storehouse       19       130       01         0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0534       Pumphouse/Storage       330       930       01         0534A       Drum Storage/Field Shop/Office       250       2700       01         0534B       Planavin Manufacture       470       13000       01
0534A         Drum Storage/Field Shop/Office         250         2700         01           0534B         Planavin Manufacture         470         13000         01
0534B Planavin Manufacture 470 13000 01
0534C Emergency Generator/Electric Vault 27 210 01
2, 210 01
0534D Emergency Generator 46 440 01
Drummed Product Storage/Gen.Storage 1000 11000 01
0543 \$ Maintainence Shops/Instrument Lab 2000 25000 01
0543A \$ Steam Meter Pit 12 93 01
0544 Heavy Equipment Maintenance Shop 180 3300 01
0545 Paint Shop 22 800 01
0556 + Hazardous Waste Tank 69 0 01
O557 Salvage Yard Storage/Maintenance 51 1000 01
0561 BCH Unit Control House 170 1600 01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu: Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0561A		Acetylene Compressor-foundation	400	5000	01
0571		Vent Gas Burner	140	520	01
0571B		Tank Room/HCCPD Drum Storage	130	2600	01
0614		Warehouse	920	11000	03
0615		Warehouse	920	11000	03
0616		Warehouse	910	11000	03
0617		Warehouse	920	11000	03
0621	\$	Property Disposal/Salvage Ofice	890	19000	04
0622		Paint Shop/General Storage	160	1700	04
0624	\$	Repair/Salvage/Surplus Facility	850	24000	04
0625	\$	Warehouse	870	11000	04
0626C		Heavy Equipment Shop-foundation	10	580	04
0627	\$	Vehicle Maintenance Shop	620	16000	04
0627B		Flammable Materials Storehouse	5	240	04
0628A	+	Diesel Fuel/Waste Oil Storage Tank	1	0	04
0629		Service Station	44	290	04
0629A	+	Diesel Oil/Gasoline Storage Tank	1	0	04
0629B	+	Diesel Oil/Gasoline Storage Tank	ı	0	04
0629C	+	Diesel Oil/Gasoline Storage Tank	1	0	04
0629D	+	Diesel Oil Storage Tank	1	0	04
0631	\$	Railcar Maintainence/Roundhouse	350	4500	04
0631A		Flammable Materials Storehouse	5	240	04
0632	\$	Gas-Fired Heating Plant	420	1400	04

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Struct		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0633		Cafeteria/Bug Lab/Movie Theatre	130	2500	04
0633A		Laboratory/Storehouse	56	680	04
0633B	\$	Hazardous Materials Storage	140	640	04
0634	\$	Flammable Materials Storehouse	58	400	04
0643		Flammable Materials Storehouse	55	400	03
0646		Rodent Control Building-foundation	5	840	04
0648A	+	Road Oil Tank	41	0	04
0648B	+	Road Oil Tank	46	0	04
0670	#\$		o	0	03
0679		Warehouse/Can Scouring-foundation	62	780	10
0724		Incinerator/Electostatic Preciptatr	460	2600	01
0727	\$	Facilities Maintenance	98	3600	01
0729	\$	General Purpose Warehouse	1600	23000	01
0732		Army Reserve Warehouse/M19 Bomb Rew	3900	47000	01
0733C		Magazine	34	400	01
0733D		Magazine	58	400	01
0733E		General Purpose Magazine	65	400	01
0735		Foamite/Oil Product Storage	37	440	01
0741	T	Refrigeration Building	880	6300	01
0743		RMA Laboratory/Change House/Office	360	5400	01
0743A		Chemical Sewer Lift Station	4	36	01
0744		Gasoline/Benzol Pumphouse	78	760	01
0745A	+	DCPD/Diesel/Benzol/Gasoline Tank	21	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Struct Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0745B	+	Gasoline/Benzol/DCPD/Diesel Tank	21	0	01
0745C	+	Gasoline Storage Tank	39	0	01
0746		Gasoline Unloading Rack	2	1	01
0748		Flammable Materials Storehouse	49	400	01
0751		Paint and Process Shop	640	5500	01
0753	T	Steam Fitter Maintenance/Storage	52	1000	01
0765	#\$	Potable Water Purification	0	0	01
0787	\$	Warehouse	480	9600	06
0793	\$	Drum Storage Warehouse	470	9600	31
0794	\$	Drum Storage Warehouse	520	9600	31
0795	\$	Drum Storage Warehouse	480	9600	31
0797	\$	Drum Storage Warehouse	480	9600	31
0808	\$	No Bdry Groundwater Treatment Plant	650	3900	23
0809	\$	Irondale Groundwater Treatment Sys.	320	3000	33
0810	\$	NW Bndry Groundwater Treatment Bldg	490	3100	27
0815	+#\$	Basin F Liquid Tank	0	0	26
0816	+ <b>#</b> \$	Basin F Liquid Tank	O	0	26
0817	+ <b>#</b> \$	Basin F Liquid Tank	0	0	26
0825	<b>#</b> \$	Basin A Neck Treatment Bldg.	o	0	35
0834		Incinerator	120	3800	36
0867В		Flammable Materials Storehouse	13	190	06
0874A		Magazine	86	800	06
0884		Igloo Storage	210	1600	06

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-4 No Future Use, Manufacturing History Process History Subgroup

Struct Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
1402	T+	8 Dichloro Tanks & Unloading Dock	200	0	25
1403	T+	2-HF Storage Tanks & Unloading Dock	83	0	25
1404	T+	Carbon Tetrachloride Storage Tank	83	0	25
1405	T+	Hydorchloride Acid Storage Tanks	83	0	25
1502	T+	Unloading Dock-Isopropanol Storage	83	0	25
1505	T+	Caustic Tank Farm	6	o	25
1507	T+	Methanol Storage Tank	83	o	25
1508	T+	TBA Storage Tank	84	0	25
1509	T	Isopropanol Dehydration Unit	76	400	25
1510	T+	Fuel Oil Tank	1200	0	25
1618		General Storehouse-N of North Plant	36	1000	25
1701	T\$	Warehouse	2300	26000	25
1704	T	Compressed Air Plant	1400	9100	25
1711	T\$	Gas Meter House	6	170	25
1712	T	Gas Heating Plant	320	2300	25
1715	T#\$		0	О	25
1717	Т\$	Chlorinating Station	11	120	25
1718	T\$	Valve Pit & Chlorinating Station	24	260	25
1726	T+	Elevated Process Water Tank	270	О	25
41104	T+	Dichloro Tank-TF 1402	1	o	25
41115	T+	Dichloro Tank-TF 1402	1	o	25
49368	T+	Dichloro Tank-TF 1402	1	0	25
49369	T+	Dichloro Tank-TF 1402	1	o	25

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-4 No Future Use, Manufacturing History
Process History Subgroup

Structu: Number	:e	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
49370	T+	Dichloro Tank-TF 1402	1	0	25
49371	T+	Dichloro Tank-TF 1402	1	o	25
49372	T+	Dichloro Tank-TF 1402	1	o	25
49373	T+	Dichloro Tank-TF 1402	1	0	25
F 50097	T+	Caustic Blending Tank-TF 1505	21	0	25
F 50098	<b>T</b> +	Caustic Blending Tank-TF 1505	21	0	25
F 50099	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5102	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5103	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5104	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5105	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5106	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5107	T+	Caustic Blending Tank-TF 1505	21	0	25
F 5108	T+	Caustic Blending Tank-TF 1505	21	0	25
NN0106		Fertil & Waste Loadng Fac-N of 728	78	99	01
NN0300	<b>#</b> \$		0	0	03
NN22		36 GW Wells-NW Boundary Treatment	0	0	22
NN23		36 GW Wells-N Boundary Treatment	0	0	23
NN24		56 GW Wells-N Boundary Treatment	0	0	24
NN28		2 GW Wells-Irondale Treatment	0	0	28
NN33		45 GW Wells-Irondale Treatment	0	0	33
PR01	+	Pipe Runs in Section 1	2000	0	01
PRO2	+	Pipe Runs in Section 2	520	0	02

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-4 No Future Use, Manufacturing History
Process History Subgroup

Structure Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
PR04 +	Pipe Runs in Section 4	100	0	04
PR25 T+	Pipe Runs in Section 25	820	0	25
PR36 +	Pipe Runs in Section 36	470	0	36
sqI-1 #\$	SQI Facility	0	0	26
SQI-2 #\$	SQI Facility	0	0	26
SQI-3 #\$	SQI Facility	0	0	26
SQI-4 #\$	SQI Facility	0	0	26
SQI-5 #\$	SQI Facility	0	0	26
SQI-6 #\$	SQI Facility	0	0	26
SQI-7 #\$	SQI Facility	O	0	26
SQI-8 #\$	SQI Facility	0	0	26
SQI-9 #\$	SQI Facility	0	0	26
SS 0312A	Substation-1T-NE of 312	0	O	36
SS 0314	Substation-3T-NW of 314	0	0	01
ss 0321	Substation-6T-S of 321	0	0	02
ss 0361	Primary Substation-68T-SE of 112	0	0	02
SS 0362	Substation-3T-N of 362	0	0	02
ss 0363	Substation-3T-N of 362	0	0	02
SS 0474	Substation-7T-W of 472	0	0	01
<b>ss</b> 0515	Substation-6T-NW of 515	0	0	01
SS 0528	Substation-1T-S of 529	0	0	01
SS 0529	Substation-3T-S of 540	0	0	01
ss 0571	Substation-3T-75'W of 504A	0	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Number	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
ss 0725	Substation-3T-S of SS 726	0	0	36
ss 0727	Substation-1T-W side of 727	o	o	01
SS 0755	Substation-3T-S of 868C	o	0	01
SS 0782	Substation-1T-N of 732	o	0	01
ss 7215	Substation-1T-fenced railcar area	o		36
SS CPR 6	Rectifier-1R-with SS 515	o	0	01
SS F182	Substation-1T-500'W of T 1512	O	0	36
ss H-1	Substation-2T-SE of 319	o	0	01
SS PSCOST	Substation-1T-1/8 mi S of 7th on C	o	0	02
SS PT56/57	Substation-2T-NE of 510	o	o	01
SS WR	Substation-1T-600'NE of 732	0	0	36
T 0014 +	Acetone Tank-TF0102	1	0	01
T 0015 +	Hexane Tank-TF0102	1	0	01
T 0019 +	MBA Storage Tank-TF0104	1	0	01
T 0058 +	Horizontal Tank-TF0106	1	0	01
T 0065 +	Caustic Soda Storage Tank-TF0103	31	0	01
T 0160 +	Chlorinated Paraffin Tank-TF0102	3	0	01
T 0161 +	Acetone Tank-TF0102	4	0	01
T 0164 +	Chlorinated Paraffin Tank-TF0102	1	0	01
T 0165 +	Aqueous Urea Tank-TF0102	1	0	01
T 0257 +	Vertical Tank-TF0106	1	0	01
T 1010 +	Hexane Tank-TF0102	1	0	01
T 1027 +	Mother Liqour Storage Tank-TF0106	1	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-4 No Future Use, Manufacturing History
Process History Subgroup

Structur Number	:e	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
T 1128	+	Methanol Tank-TF0104	1	0	01
т 1129	+	MMAA Tank-TF0104	1	0	01
T 1132	+	Trimethylphosphite (TMP) Tank-TF010	1	0	01
т 1133	+	MMA Tank-TF0104	1	0	01
T 1135	+	Sulfuryl Chloride Tank-TF0104	1	0	01
T 1139	+	Sulfuryl Chloride Tank-TF0104	1	0	01
T 1140	+	Chloroform Tank-TF0104	1	0	01
T 1146	+	Dicetene Tank-TF0110	2	0	01
т 1147	+	Dicetene Tank-TF0110	2	0	01
T 1148	+	Diketene Storage Tank-TF0104	1	0	01
T 1149	+	Diketene Tank-TF0104	1	0	01
T 1150	+	Monomethylamine Tank-TF0104	1	0	01
T 1151	+	Monomethylamine Tank-TF0104	1	0	01
T 1168	+	Brine Storage Tank-SE corner 528	5	0	01
T 1178	+	Acetone Storage Tank-TF0103	1	0	01
T 1202	+	Chlorine Tank-TF0103	1	0	01
T 1203	+	Ammonia Storage Tank-TF0103	2	0	01
T 1204	+	Urea Storage Tank-TF0103	3	0	01
T 1216	+	Mother Liquor/Dinitro Tank-TF0102	6	0	01
T 1219	+	Mixed Acid Tank-TF0101	22	0	01
T 1220	+	Mixed Acid Tank-TF0101	22	0	01
T 1222	+	MMA Blending Tank-TF0104	1	0	01
T 1235	+	Glycol Storage Tank-TF0108	1	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Table A.1-4 No Future Use, Manufacturing History
Process History Subgroup

Structu: Number	ce	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
T 1246	+	Diketene Tank-TF0104	1	0	01
T 1247	+	Diketene Tank-TF0104	1	0	01
T 1253	+	Acetaldoxime Storage Tank-TF0108	1	0	01
T 1267	+	Caustic Tank-TF0101	1	0	01
T 1273	+	Vertical Tank-TF0103	16	0	01
T 1279	+	Methylene Chloride Tank-TF0108	1	0	01
T 1288	+	Methyl Mercaptan Surge Tank-TF0108	1	0	01
T 1289	+	Dibrom/MIBK Storage Tank-TF0108	1	0	01
T 1291	+	Acetaldoxime Dilution Tank-TF0108	5	0	01
T 1296	+	Spent Acid Tank-TF0101	22	0	01
T 1307	+	Spent Acid Tank-TF0101	17	0	01
T 1322	+	Sulfuryl Chloride Tank-TF0104	2	0	01
T 1323	+	Sulfuryl Chloride Tank-TF0104	2	0	01
T 1324	+	Brine Storage Tank-TF0103	1	0	01
T. 1340	+	Crystal, Acetone Tank-TF0102	16	0	01
T 1390	+	Vertical Tank-E of 512	5	0	01
T 1391	+	Vertical Tank-E of 512	5	0	01
T 1433	+	Caustic Storage Tank-TF0108	11	0	01
T 1500	+	Caustic Tank-TF0105	21	0	01
T 1501	+	Separator Tank-TF0105	130	0	01
T 1502	+	Vertical Tank-TF0105	25	o	01
T 1503	+	Vertical Tank-TF0105	15	0	01
T 1504	+	Vertical Tank-TF0105	15	0	01

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu: Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
T 1505	+	Caustic Tank-TF0105	240	0	01
T 1506	+	Surge Tank-TF0105	240	o	01
T 1509	+	Cuprous Sulfide Storage Tank-TF0105	490	0	01
T 1510	+	DET Effluent Storage Tank-TF0105	110	0	01
T 1511	+	Fuel Oil Storage Tank-TF0105	47	0	01
T 1512	\$+	Incinerator Feed Stor Tank-N of 7th	120	0	36
T 1513	\$+	Incinerator Feed Stor Tank-N of 7th	120	0	36
T 1514	+	Atmospheric Storage Tank-TF0105	8	0	01
T 1515	+	Atmospheric Storage Tank-TF0105	17	0	01
T 1516	+	Cuprous Sulfide Settler Tank-TF0105	36	0	01
T 1566	+\$	Liquid Fertilizer Tank-N of 7th	450	0	36
V 1001	+	Vinyl Chloride Tank-W of 512	1	0	01
<b>V</b> 1002	+	Vinyl Chloride Tank-W of 512	2	0	01
V 1156	+	Horizontal Tank-TF0106	6	0	01
V 1186	+	Methyl Mercaptan Relief Tank-TF0108	1	0	01
V 1187	+	MIC Relief Knockout Vessel-TF0106	1	0	01
V 1220	+	Vertical Tank-TF0106	6	0	01
<b>v</b> 1255	+	DET Effluent Suction Vessel-TF0105	10	0	01
V 1264	+	Horizontal Tank-TF0105	. 1	0	01
<b>V</b> 1267	+	Surge Vessel-TF0105	2	0	01
al:	365		119371	1024806	

<sup>\$ -</sup> Remediation Use Structure

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

		<del>-</del> ,			
Struct: Number	ure	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0313		Laboratory	1000	10000	01
0315		Warehouse-Laundry	1000	10000	01
0319		Magazine/Flammable Material Storage	52	400	01
0412	T	Mustard Filling, Manuf., and Storag	1600	12000	01
0414		Mustard Scrubber Unit-foundation	79	310	01
0416		H/Dichlor Disposal Reactor-foundatn	79	300	01
0417		H/Dichlor Decon Pit-foundation	79	280	01
0422	*	H Manufacture/Aldrin Production	2100	23000	01
0426	*	Mustard Disposal Reactor-foundation	59	1600	01
0427		Decontamination Pit-fdn	4	80	01
0428		Incinerator	6	56	01
0429		H Brine Mixing/Pesticide Mfg.	15	560	01
0431		Ethylene Dryer/Comprssr/Refrigeratn	660	6300	01
0512	T	Filling/Pesticide Production	610	3800	01
0514	<b>T</b> *	Lewisite/HD/Pesticide Production	3200	27000	01
0514A	T	L/M-1 Storage/Dowtherm Boiler	110	1700	01
0516	T	Lewisite Distillation/Pest. Prod.	1400	13000	01
0528	T	HD Burning/Pesticide Manufacture	380	2200	01
0536	<b>T</b> *	Ammo.Dem.Facility/Crude MustardSto.	990	4100	01
0537	<b>T</b> *	Thaw House	2300	16000	01
0538	<b>T</b> *	Ton Container Reconditioning Plant	1200	15000	01
0540	T	Ton Container Renovation Plant	330	4900	01
0541		Warehouse/WP Filling	770	11000	01
0725		Bomb Testing Station	99	460	36

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup>\* -</sup> Indicates Structure with Agent Contaminated Tanks or Process Equipment

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Struct: Number	ure	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0726		Bomb Test Building	40	430	36
0728	\$	HD Filling/Pesticide Storage/Wareh.	1400	21000	01
0742	T\$	Warehouse	4800	49000	01
0742A	T*	Tank House	330	1300	01
0785		Warehouse	1400	29000	06
0786	\$	Warehouse	480	9600	06
0788	\$	Warehouse	480	9600	06
0791	\$	Warehouse	480	9600	31
0792	\$	Drum Storage Warehouse	440	9600	31
0796	\$	Warehouse	480	9600	31
0798	\$	Drum Storage Warehouse	480	9600	31
0881	\$	Igloo Storage	210	1600	06
0882	\$	Igloo Storage	210	1600	06
0883		Igloo Storage	210	1600	06
0885	\$	Igloo Storage	210	1600	06
0886	\$	Igloo Storage	210	1600	06
1501	<b>T</b> *	GB Manufacturing/Demil. Building	9000	81000	25
1503A	T*	Scrubber Facility-1503A/B/C=1503	440	580	25
1503B	T*	Scrubber Facility-1503=1503A/B/C	88	580	25
1503C	<b>T</b> *	Scrubber Facility-1503=1503A/B/C	79	580	25
1504	T	200-ft Steel Stack	630	710	25
1506	T*	GB Storage	1900	9000	25
1601	T*	GB Filling	7700	69000	25
1601A	<b>T</b> *	Ammunitions Demilitarization Facil.	670	2800	25

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup>\* -</sup> Indicates Structure with Agent Contaminated Tanks or Process Equipment

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
1602	T*	Paint Storage	620	2200	25
1603A	T*	Scrubber Facility	89	580	25
1603B	<b>T</b> *	Scrubber System-1603=1603A/B	89	580	25
1605	T	Munitions Storage Igloo	150	1000	25
1606	<b>T</b> *	Cluster Assembly Buildinge	14000	60000	25
1607	T\$	Warehouse	1700	26000	25
1608	T	Munitions Storage Igloo	150	1000	25
1609	T	Munitions Storage Igloo	150	1000	25
1610	T	Munitions Storage Igloo	150	1000	25
1611	T	Demilitarization Facility	3100	32000	25
1613	T	Explosive Unpacking Building	77	750	25
1614	T	Warehouse	260	7800	25
1615	T	Warehouse	170	4000	25
1616	T	Warehouse	85	4000	25
1702	T	Weld Shop	49	2400	25
1703	T	Spray Dryer Facility	2700	28000	25
1727	T	Industrial Waste Sewer	36	700	25
1735		Loading Dock	670	11000	31
T 0027	+	Vertical Tank-TF0107	1	0	01
al:	6	7	74735	678636	

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup>\* -</sup> Indicates Structure with Agent Contaminated Tanks or Process Equipment

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structu: Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0131		NCO Family Quarters	56	840	35
0134		Family Housing	87	1200	35
0141		West Gate Security Police Building	130	6300	04
0149		Administration	110	5100	04
0151		B.O.Q. Barracks	190	8200	34
0154		Bachelor Officers Quarters-foundatn	51	8200	34
0155		Barracks & Classrooms-fdn-N of 151	52	8200	34
0157		Men's Barracks-foundation-S of 159	54	8200	34
0158		NCO Service Club-fnd-SW of 159	36	8200	34
0159		Mens Barracks	190	8200	34
0162		NCO Apts-fdn-SW of 166	37	4100	34
0163		Bowling Alley	140	2700	34
0164		Officer's Apts-foundation-W of 166	63	8200	34
0165		Troop Supply Building-E of 166	46	1300	34
0166		Vault Storage Building	110	1100	34
0167		Hobby Shop/Recreation	58	620	34
0463D	<b>@</b> +	Waste Storage Tank(US-4)	220	0	01
0463E		Storage Tank	1000	0	01
0755	@	Change House/Storage	41	480	01
0756	6	Blender/Scrubber Metering House	140	84	01
0757	<b>@</b> +	UDMH Storage Tank Farm	490	0	01
0758A	@	Fire Protection Valve Pit	11	91	01
0759	9	Drum Cleaning	32	800	01
0760	@	Drum Storage Facility	9	200	01
0761	@	Drum Loading Station	10	150	01

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

rev 06/21/93

<sup>@ -</sup> Hydrazine Facility

Structu Number	ire	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0805	<b>@</b> +	Storage Tank	79	0	01
0846		Recreation Building	100	8800	12
0868C	<b>e</b>	Office/Ton Container Storage Shed	24	290	01
cs-1	<b>@</b> +	Hydrazine Storage	67	0	01
HAS-1	<b>@</b> +	Hydrazine or Aerozine Tank	67	0	01
HAS-2	<b>@</b> +	Hydrazine or Aerozine Tank	67	0	01
HAS-3	<b>@</b> +	Hydrazine or Aerozine Tank	67	0	01
NN0901		Con.Struc-1300'SE of 6th & A St	8	96	09
NN1201		Long Metal Shed-25'W of 846	4	850	12
NN1202		Square Metal Shed-W of 846	5	410	12
NN1203		Wooden Shed-W of 846	5	200	12
NN1204		Wooden Frame/fdn-S of 846	4	100	12
NN1205		Wooden Shed-S of 846	3	85	12
NN1206		Shooting Bunker-S of 846	6	76	12
NN1207		Shooting Bunker #2-S of 846	14	76	12
US 1	<b>@</b> +	UDMH Storage	110	0	01
US 2	<b>@</b> +	UDMH Storage	110	0	01
al:	4:	2	4103	93448	

<sup>+ -</sup> Indicates Tanks, Tank Farms, Pipe Runs

<sup>@ -</sup> Hydrazine Facility

Table A.1-7 Remediatioin Use Structure

Page 1 of 6

Structu	ure	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0112A	\$	Emergency Generator Plant	35	240	35
0130	#\$		0	0	35
0132	<b>#</b> \$	Shell/MKE Field Headquarters	0	0	35
0211	\$	Gas Meter House	21	240	02
0311	\$	Sterns-Rogers Office/Sample Storage	350	4400	02
0315A	\$	Steam Meter Pit-W of 315	7	100	01
0318	<b>#</b> \$		o	0	35
0321	\$	Boiler Plant-Central Gas Heat Plant	6000	56000	02
0321A	\$+	Tank	4	o	02
0321C	\$	Pumphouse	37	580	02
0321D	\$	Fuel Oil Pumphouse	38	480	02
0331	\$	Phosgene Filling Warehouse	1000	12000	02
0332	\$	Warehouse	1000	12000	02
0333	\$	Warehouse	980	11000	02
0334	\$	Warehouse	980	11000	02
0335	\$	Warehouse	990	11000	02
0336	\$	General Purpose Warehouse	990	11000	02
0341A	\$	Condensate Pump House	15	160	02
0346	\$	Warehouse	920	11000	02
0347	\$	Warehouse/Chemical Storage	1900	27000	02
0361	\$	Primary Electrical Substation	54	380	02
0362	\$	Warehouse	4000	59000	02
0369	\$	Lower Derby Valve Gate	20	49	01
0370	#\$		O	0	02

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Structure Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0371	\$	Water Pumping Station	820	1800	02
0372A	\$	Chlorinator Station	56	380	02
0378	\$	Chlorinating Station (on airport)	16	150	10
0379	\$	Chlorinating Station	20	210	03
0381	<b>#</b> \$		0	0	02
0385	\$	Water Pump Station	14	140	04
0386	\$	Water Pump Station	14	140	04
0387	\$	Water Pump Station	14	140	04
0392	\$	Sewage Lift Station	46	260	34
0393	\$	Sewage Lift Station	46	260	34
0518A	\$	Emergency Fire Protection Generator	22	290	01
0543	\$	Maintainence Shops/Instrument Lab	2000	25000	01
0543A	\$	Steam Meter Pit	12	93	01
0543B	\$	Facilities Engineers	590	8700	01
0551	\$+	Elevated Storage Tank	620	0	01
0552	\$	Valve Pit	55	310	01
0618	\$	Warehouse	5300	110000	03
0619	\$	Warehouse	5200	110000	03
0621	\$	Property Disposal/Salvage Ofice	890	19000	04
0621A	\$	Truck Scale Platform	56	740	04
0624	\$	Repair/Salvage/Surplus Facility	850	24000	04
0625	\$	Warehouse	870	11000	04
0627	\$	Vehicle Maintenance Shop	620	16000	04
0630	\$	Gas Meter House	37	240	03

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Table A	A.1-7 I	Remediatioin Use Structure		Page	3 of 6
Struct: Number	ure	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0631	\$	Railcar Maintainence/Roundhouse	350	4500	04
0632	\$	Gas-Fired Heating Plant	420	1400	04
0633B	\$	Hazardous Materials Storage	140	640	04
0634	\$	Flammable Materials Storehouse	58	400	04
0670	<b>#</b> \$		0	0	03
0673	\$	Railcar Scale House	2	88	03
0727	\$	Facilities Maintenance	98	3600	01
0728	\$	HD Filling/Pesticide Storage/Wareh.	1400	21000	01
0729	\$	General Purpose Warehouse	1600	23000	01
0742	\$	Warehouse	4800	49000	01
0765	<b>#</b> \$		0	0	01
0786	\$	Warehouse	480	9600	06
0787	\$	Warehouse	480	9600	06
0788	\$	Warehouse	480	9600	06
0791	\$	Warehouse	480	9600	31
0792	\$	Drum Storage Warehouse	440	9600	31
0793	\$	Drum Storage Warehouse	470	9600	31
0794	\$	Drum Storage Warehouse	520	9600	31
0795	\$	Drum Storage Warehouse	480	9600	31
0796	\$	Warehouse	480	9600	31
0797	\$	Drum Storage Warehouse	480	9600	31
0798	\$	Drum Storage Warehouse	480	9600	31
0801	T\$	Radio Relay Station-N of 1726	12	180	25

0808 \$ No Bdry Groundwater Treatment Plant 650 3900 23

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Table A.1-7 Remediatioin Use Structure				Page	4 of 6
Struct Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
0809	\$	Irondale Groundwater Treatment Sys.	320	3000	33
0810	\$	NW Bndry Groundwater Treatment Bldg	490	3100	27
0815	<b>#</b> \$		0	0	26
0816	<b>#</b> \$		0	0	26
0817	#\$		0	0	26
0825	#\$		0	0	35
0831	\$	Technical Escort/Officer's Quarters	120	1100	35
0831A	\$	Garage/Storage Shed	27	360	35
0840	#\$		0	0	25
0866	\$	Toxic Yard Office & Change House	140	2400	06
0881	\$	Igloo Storage	210	1600	06
0882	\$	Igloo Storage	210	1600	06
0885	\$	Igloo Storage	210	1600	06
0886	\$	Igloo Storage	210	1600	06
1607	T\$	Warehouse	1700	26000	25
1701	T\$	Warehouse	2300	26000	25
1710	T\$	Clinic and Administration Building	920	15000	25
1711	T\$	Gas Meter House	6	170	25
1713	T\$	Standby Generator Plant	100	2500	25
1715	<b>T#</b> \$		0	0	25
1717	T\$	Chlorinating Station	11	120	25
1718	T\$	Valve Pit & Chlorinating Station	24	260	25
1719	T\$	Electrical Distribution System	13	130	25

<sup>\$ -</sup> Remediation Use Structure

NN0300 #\$

0

0 03

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Table A.1-7 Remediatioin Use Structure

Page 5 of 6

Structu Number	re	Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
NN0902	\$	Survey Tower-N of Post Office	1	140	09
NN2002	\$	Tank Pad-N of 9th, 2/3 mi E of F St	14	380	20
NNT2601	\$+	3 Tanks for Basin F Liquid Holding	0	0	26
SQI-1	<b>#</b> \$	SQI Facility	0	0	26
SQI-2	<b>#</b> \$	SQI Facility	0	0	26
SQI-3	<b>#</b> \$	SQI Facility	0	0	26
SQI-4	#\$	SQI Facility	0	0	26
SQI-5	<b>#</b> \$	SQI Facility	0	0	26
SQI-6	<b>#</b> \$	SQI Facility	0	0	26
SQI-7	<b>#</b> \$	SQI Facility	0	O	26
SQI-8	<b>#</b> \$	SQI Facility	0	0	26
SQI-9	<b>#</b> \$	SQI Facility	0	0	26
T 1512	\$+	Incinerator Feed Stor Tank-N of 7th	120	0	36
T 1513	\$+	Incinerator Feed Stor Tank-N of 7th	120	0	36
T 1566	+\$	Liquid Fertilizer Tank-N of 7th	450	0	36
z-28	<b>#</b> \$		0	0	23
z-3	<b>#</b> \$		0	0	35
<b>z-</b> 36	<b>#</b> \$		0	0	01
z-38	<b>#</b> \$		0	0	04
z-39	<b>#</b> \$		0	O	04
<b>z-4</b> 0	<b>#</b> \$		0	o	25
z-41	<b>#</b> \$		0	0	25
<b>z-4</b> 2	<b>#</b> \$		0	0	25
<b>Z-</b> 56	<b>#</b> \$		0	o	35

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure rev 06/21/93

Table	<b>D</b> .	1 _ 7	Pamadi	atioin	1100	Structure

Page	6	of	6
------	---	----	---

Struct Number		Description of Structure	Bank Volume (Cubic Yards)	Size Sq Ft	Section
z-57	#\$		0	0	35
<b>z-</b> 58	<b>#</b> \$		0	0	35
z-68	<b>#</b> \$		0	0	35
z-69	<b>#</b> \$		0	0	35
<b>z-70</b>	<b>#</b> \$		0	0	04
al:	125		60025	856850	

<sup>\$ -</sup> Remediation Use Structure

<sup># -</sup> Structure Added Since 1986, Not Part of Task 24(EBASCO, 1988)

T - Indicates Treaty Structure

Appendix B
Estimates of Structural Material Volumes

# TABLE OF CONTENTS

Section	<u>on</u>		Page
B1.0	INTRO	DDUCTION	. B-1
B2.0	TASK	24 DATABASE FIELDS	. B-1
	B2.1	TOTAL NUMBER OF STRUCTURES (BUILDING)	
	B2.2	TOTAL STANDING VOLUME (S_BLDG_VOL)	
	B2.3	TOTAL COLLAPSED VOLUME (C_BLDG_VOL)	
	B2.4	TOTAL COLLAPSED VOLUME OF PROCESS EQUIPMENT	
	-	(C_EQUIPVOL)	. B-2
	B2.5	TOTAL COLLAPSED VOLUME OF PIPING (PIPING_VOL)	
	B2.6	SO_FT	
	B2.7	STORIES	. B-3
	B2.8	ROOF_TYPE	. B-3
	B2.9	WALL_TYPE	. B-3
	B2.10	FOUND_TYPE	. B-4
B3.0	STRU	CTURES FS QUANTITY CALCULATIONS	. B-4
	B3.1	TOTAL STRUCTURE FOOTPRINT (TSF)	
	B3.2	CAPPING AREA (CAP_AREA)	
	B3.3	TOTAL STRUCTURE FOOTPRINT PERIMETER (PERIMETER)	. B-6
	B3.4	ROOF VOLUME IN CUBIC YARDS (CYDROOF)	. <b>B</b> -7
	B3.5	WALL VOLUME IN CUBIC YARDS (CYDWALL)	. B-8
	B3.6	TOTAL COLLAPSED VOLUME AND SALVAGE VOLUME OF	
		STRUCTURAL MATERIALS	. B-9
	B3.7	TREATABLE SURFACE AREA, IN SITU SAND BLASTING	
		AND VACUUM DUSTING (TSA_SB_VD)	B-10
	B3.8	TREATABLE SURFACE AREA, IN SITU STEAM CLEANING	
		(TSA_SC)	<b>B</b> -10
	B3.9	INTERIOR SURFACE AREA (ISA)	<b>B</b> -11
	B3.10	EXTERIOR AND INTERIOR SURFACE AREA (EISA)	B-11
B4 0	REFEI	RENCES	B-12

Structures DAA

# LIST OF ACRONYMS AND ABBREVIATIONS

DAA Detailed Analysis of Alternatives

FS Feasibility Study

FT Feet

RMA Rocky Mountain Arsenal

Cu ft Cubic Foot
Cu yd Cubic Yard
SF Square Feet

#### B1.0 INTRODUCTION

This appendix describes the contents of the Task 24 Database and the material quantity calculations for the Structures Feasibility Study (FS), which were used to develop cost estimates for alternatives developed in the Structures Detailed Analysis of Alternatives (DAA). The Task 24 Database was originally developed during the Structures Survey at Rocky Mountain Arsenal (RMA) (EBASCO 1988/RIC88306R02) to provide general information on structure volumes and areas as well as roof and wall types. During the DAA, however, more specific information was needed on volumes and areas and structural debris quantities to accurately evaluate remedial alternatives. The Structures FS quantity calculations were therefore developed. This set of algorithms manipulates information contained in certain fields of the Task 24 Database to arrive at quantity values (e.g., total structure footprint, wall volume in cubic yards, salvage volume of structural materials) that were used to evaluate the cost of an alternative.

#### B2.0 TASK 24 DATABASE FIELDS

The Task 24 Database presents field survey data for all structures at RMA. The surveys were conducted in 1987, and included estimates of structure material types and volumes. The database consists of 86 fields, 12 of which were used to calculate material quantities for the structures DAA. The 12 fields of interest include the following:

BUILDING = structure number

S\_BLDG\_VOL = standing structure volume

C\_BLDG\_VOL = collapsed structure volume, neatly stacked

FDN\_AB\_GRD = foundation above ground surface

FDN\_BL\_GRD = foundation below ground surface

C\_EQUIPVOL = collapsed structure volume, neatly stacked

PIPING\_VOL = collapsed piping volume, neatly stacked

SQ\_FT = total square feet of structure floor space

STORIES = number of stories in a structure

ROOF\_TYPE = type of roofing materials for a structure

WALL\_TYPE = type of foundation materials for a structure

FOUND\_TYPE = type of foundation materials for a structure

The following sections describe these fields in further detail.

#### B2.1 TOTAL NUMBER OF STRUCTURES (BUILDING)

This field provides the structure number. Structures were grouped according to Structures FS medium groups. The total number of structures within a medium group is the sum of the records in the building field.

#### B2.2 TOTAL STANDING VOLUME (S\_BLDG\_VOL)

This field provides the total standing volume for each structure. The sum of all these values is the total standing volume of structures in the medium group.

## B2.3 TOTAL COLLAPSED VOLUME (C\_BLDG\_VOL)

This field provides the collapsed and neatly stacked volume of all structural materials within the structure. Structural material is made up of foundations, interior and exterior walls, floors, ceilings, and roofs. It does not include process equipment or piping. The sum of these values is the total collapsed volume of structural material in the medium group. Two exceptions should be noted about the values in this field:

1. The collapsed structure volume is zero, but a volume is given for foundation materials. In this case, C\_BLDG\_VOL was calculated as follows:

$$C_BLDG_VOL = FDN_AB_GRD + FDN_BL_GRD$$

where:

FDN\_AB\_GRD = volume of foundation material above ground surface FDN\_BL\_GRD = volume of foundation materials below ground surface

2. The collapsed structure volume is less than the volume for structural materials. In this case, C\_BLDG\_VOL was increased by the volume of FDN\_AB\_GRD and FDN\_BL\_GRD, as follows:

C\_BLDG\_VOL(adjusted) = FDN\_AB\_GRD + FDN\_BL\_GRD + C\_BLDG\_VOL

# B2.4 TOTAL COLLAPSED VOLUME OF PROCESS EQUIPMENT (C\_EQUIPVOL)

This field provides the collapsed and neatly stacked volume of all process equipment contained in the structure. The sum of these values is the total collapsed volume of process equipment in the medium group.

## B2.5 TOTAL COLLAPSED VOLUME OF PIPING (PIPING\_VOL)

This field provides the collapsed and neatly stacked volume of all piping contained in each structure. The sum of these values is the total collapsed volume of piping in the medium group.

#### B2.6 SQ\_FT

This field provides the total square feet of floor space for the structure. The sum of these values is the total square footage of the medium group.

#### **B2.7 STORIES**

This field indicates the number of stories in a structure.

## B2.8 ROOF\_TYPE

This field categorizes the type of roofing material used. The options for this field include the following:

CA = corrugated asbestos

CM = corrugated metal

C = concrete

A = asphalt shingle

B = built-up/hot tar

N = none

W = wood

WA = wood and asphalt

M =sheet metal

FG = fiberglass

#### B2.9 WALL\_TYPE

This field categorizes the type of wall material used. For the purposes of the FS, it was assumed that the floors are made of the same material as the walls. The options for this field include the following:

FG = fiberglass

C = concrete

W = wood

T = tile

B = brick

M = masonry/cinder block

CM = corrugated metal

CA = corrugated asbestos

A = asbestos board

N = none

#### B2.10 FOUND\_TYPE

This field categorizes the type of foundation material. The options for this field include the following:

C = concrete

W = wood

N = none

#### **B3.0 STRUCTURES FS QUANTITY CALCULATIONS**

The Structures FS quantity calculation algorithms made use of data in certain fields of the Task 24 Database to develop more specific values on area, volume, and structural debris for use in the DAA. The calculated values include the following:

TSF = total structure footprint

CAP\_AREA = area of cap

PERIMETER = perimeter of structure

CYDROOF = volume of roof material

CYDWALL = volume of wall and floor material

CONCRETE = volume of concrete

WOOD = volume of wood

TILE = volume of structural tile

BRICK = volume of brick

MASONRY/CINDER BLOCK = volume of masonry or cinder block

CORRUGATED METAL = volume of corrugated metal

CORRUGATED ASBESTOS = volume of corrugated asbestos

ASBESTOS BOARD = volume of asbestos board

FIBERGLASS = volume of fiberglass

ASPHALT SHINGLE = volume of asphalt shingle

BUILT-UP/HOT TAR = volume of built-up or hot tar roofing

SHEET METAL = volume of sheet metal

WOOD AND ASPHALT = volume of wood and asphalt, considered roofing

SCRAP METAL = volume of scrap metal, which is the sum of metals listed above, plus rebar

TSA\_SB\_VD = treatable surface area for sand blasting or vacuum dusting

TSA\_SC = treatable surface area for steam cleaning

ISA = interior surface area of structure

EISA = exterior and interior surface area of structure

#### **B3.1 TOTAL STRUCTURE FOOTPRINT (TSF)**

The SQ\_FT and STORIES fields were used to determine TSF. SQ\_FT provided the total square feet of floor space for the structure, and STORIES provided the number of stories. For buildings with STORIES ≥#2. TSF was calculated as:

$$TSF = (SQ_FT)/(STORIES)$$

For structures with STORIES = 0 or 1, TSF was calculated as:

$$TSF = (SQ_FT)$$

#### B3.2 CAPPING AREA (CAP\_AREA)

CAP\_AREA is the area required for the clay cap alternative. Two caps are planned exclusively for structural materials from the Process and Non-Process Subgroups. The first cap covers consolidated structure debris from the Railyard Area and the vicinity, referred to here as the Railyard Region. The Railyard Region consists of all process and non-process structures from Sections 3, 4, 9, 10, 28, 33, and 34. The second cap covers consolidated structure debris from North Plants and the vicinity, here called the North Plants Region. The North Plants Region consists of all process and non-process structures from Sections 20, 22, 23, 24, 25, 26, 27, and 30. The remaining process and non-process structures from Sections 1, 2, 6, 12, 31, 35, and 36 are consolidated as grade fill in the central processing area in South Plants, and capped as part of soils treatment alternatives.

The two caps were assumed to be square, and the consolidated debris was assumed to be placed at an average depth of 2.5 feet A 7.5-ft fringe was added to all sides of the cap to extend beyond the debris. The cap area was calculated as follows:

1) Debris area = (Debris Volume)
$$x(27)/(2.5)$$

Where:

Debris Volume = volume of structure debris from the process and non-process groups within the consolidation region

= cubic feet/cubic yards (cu ft/cu yd)

2.5 = average debris depth in ft

2) Length of Side = (Debris Area) $^{1/2}$  + 15

Where:

Length of Side = length of individual cap side in ft 15 = total fringe length required per side in ft

3) Individual Cap Area =  $(Length of side)^2$ 

Where:

Individual Cap Area = area of the cap for a given consolidation region in square feet (SF)

4) Total Cap Area = Railyard Region Cap + North Plants Region Cap

Where:

Total Cap Area = total area of cap required for this alternative in SF

Because the caps include debris from two subgroups, costs needed to be distributed. Cost were distributed by calculating the fraction of the total debris volume that comes from the process and non-process structures as follows:

Process Fraction = (process debris from the Railyard Region and North Plants Region)/(process and non-process debris from the Railyard Region and North Plants Regions)

Process Cap Area = (Process Fraction) x (Total Cap Area)

Non-process Fraction = (non-process debris from the Railyard Region and North Plants Region)/(process and non process debris from the Railyard Region and North Plants Region)

Non-process Cap Area =  $(Non-process Fraction) \times (Total Cap Area)$ 

#### B3.3 TOTAL STRUCTURE FOOTPRINT PERIMETER (PERIMETER)

TSF was used to determine PERIMETER. This calculation involved performing two steps. Using a representative sample of length and width dimensions of individual structures (derived from the Task 24 Structure Survey report), the ratio of a structure perimeter to the original footprint area was first determined for several structures. These ratios were then plotted and extrapolated to determine factors that could be used to calculate PERIMETER. Listed below are the representative square footage amounts and the resulting factors:

<u>TSF</u>	<u>Factor</u>
0-200	0.250
201-300	0.227
301-400	0.200
401-500	0.172
501-600	0.158
601-700	0.144
701-800	0.130
801-900	0.120
901-1000	0.112
1001-2000	0.0925
<u>TSF</u>	<u>Factor</u>

2001-3000	0.0767
3001-4000	0.0663
4001-5000	0.0610
5001-6000	0.0558
6001-7000	0.0529
7001-8000	0.0494
8001-9000	0.0461
9001-10,000	0.0435
10,001-20,000	0.0350
20,001-30,000	0.0308
30,001-40,000	0.0275
40,001-50,000	0.0250
50,001-60,000	0.0229

PERIMETER was calculated as follows:

$$PERIMETER = (TSF) \times (Factor)$$

PERIMETER is not presented in the material volume tables.

Perimeter values for alternatives involving fencing were calculated using PERIMETER. It was assumed that the buffer zone surrounding the structure to be fenced is 10 ft on each side and that the structure itself is rectangular, which adds 80 ft to the total structure perimeter. The calculation is as follows:

fence perimeter = 
$$(PERIMETER) + (80)$$

#### B3.4 ROOF VOLUME IN CUBIC YARDS (CYDROOF)

The Task 24 Database does not present roof volume separately, so a roof material quantity algorithm was developed. It assumed that a roof is 1/10 ft thick, and that it is the same area as the building footprint. Several conditions were added to the algorithm to account for situations where the roof volume is negligible. The volume was calculated as follows:

$$CYDROOF = (TSF) \ x \ (0.1)/27, \\ [if C_BLDG_VOL = (FDN_AB_GRD + FDN_BL_GRD), \\ then \ CYDROOF = 0 \ and \ CYDWALL = 0], \\ [if 0.75 \ x \ C_BLDG_VOL \le (FDN_AB_GRD + FDN_BL_GRD) < C_BLDG_VOL, then \\ CYDROOF = 0 \ and \ CYDWALL = C_BLDG_VOL - (FDN_AB_GRD + FDN_BL_GRD)]$$

where:

TSF = total structure footprint (SF)

0.1 = thickness of roof (ft)

= # cu ft/cu yd

ROOF\_TYPE is not presented in the material volume tables.

#### B3.5 WALL VOLUME IN CUBIC YARDS (CYDWALL)

The Task 24 Database does not present wall volume separately, so a wall and floor material quantity algorithm was developed. It was assumed that the wall and floor volume and the roof volume together add up to the bank cubic yards of structure material. The wall and floor volume was calculated as follows:

where:

C BLDG VOL = bank building volume from Task 24 Database

CYDROOF = roof volume calculated above

FDN AB GRD = foundation volume aboveground surface from Task 24 Database

FDN\_BL\_GRD = foundation volume belowground surface from Task 24 Database

WALL\_TYPE is not presented in the material volume tables.

# B3.6 TOTAL COLLAPSED VOLUME AND SALVAGE VOLUME OF STRUCTURAL MATERIALS

The quantities of roof, wall, and foundation material types were summed together to create total collapsed material volumes. For example, the total concrete volume for a structures medium group is the sum of all the roof, wall, and foundation concrete quantities for that medium group. The calculation in this case is as follows:

The salvage volume of scrap metal applies only to manufacturing structures, and is based on the following assumptions:

- Process equipment, process piping, and tanks will be demolished and treated as part of
  the IRA efforts. It is assumed that 80 percent of the total volume of these items will be
  available as scrap metal.
- The scrap metal from the non-process structure group will be available for salvage. It is assumed that 80 percent of the total volume of scrap metal will be available. The algorithm used to calculate this volume is as follows:

Salvage volume of scrap metal =  $0.5 \times [corrugated metal + sheet metal + 0.03 \times (concrete volume)]$ 

B3.7 TREATABLE SURFACE AREA, IN SITU SAND BLASTING AND VACUUM DUSTING (TSA\_SB\_VD)

TSA\_SB\_VD was calculated using the following data from the following fields: TSF, STORIES, PERIMETER, CYDWALL, FDN\_AB\_GRD and FDN\_BL\_GRD. It was assumed that the treatments are applied to walls and floors and foundations, so separate calculations were created for these two physical groups. TSA\_SB\_VD is the sum of the two calculations described below.

The treatable surface area for walls and floors was applied to CYDWALL for concrete, tile, brick, and masonry. It was assumed that the treatment is applied to 30 percent of the interior surface area and to a maximum of 5 ft up the interior walls. The calculation is as follows:

Treatable surface area, walls and floors =  $0.3 \times [TSF \times STORIES$ , unless STORIES = 0, then use TSF] +  $0.3 \times [(PERIMETER) \times 5$ , unless STORIES = 0, then use 0] +  $0.3 \times [0.15 \times 5 \times PERIMETER$ , unless STORIES = 0, then use 0]

The treatable surface area for foundations was applied to FDN\_AB\_GRD and FDN\_BL\_GRD for concrete material types. The calculation is as follows:

Treatable surface area, foundations =  $0.3 \times TSF$ 

B3.8 TREATABLE SURFACE AREA, IN SITU STEAM CLEANING (TSA\_SC)
TSA\_SC was calculated using data from the following fields: TSF, STORIES, and PERIMETER.

The calculations are similar to those performed for in situ sand blasting and vacuum dusting (Section B3.10). The treatment is applied to the walls and floors and foundations, so separate calculations were created for these two physical groups.

The treatable surface area for walls and floors was applied to CYWALL for concrete, tile, and masonry. It was assumed that the treatment is be applied to 30 percent of the interior surface area and to a maximum of 5 feet up the interior walls. The calculation is as follows:

Treatable surface area, walls and floors =

0.3 x [TSF x STORIES, unless STORIES = 0, then use TSF] +

0.3 x [(PERIMETER) x 5, unless STORIES = 0, then use 0] +

0.3 x [0.15 x 5 x PERIMETER, unless STORIES = 0, then use 0]

The treatable surface area for foundations was applied to FDN\_AB\_GRD and FDN\_BL\_GRD for concrete material types. The calculation is as follows:

Treatable surface area, foundations =  $0.3 \times TSF$ 

#### **B3.9 INTERIOR SURFACE AREA (ISA)**

ISA was calculated based on the STORIES field from the Task 24 Database and from the calculated value for PERIMETER described in Section B3.3. It was assumed that the wall height is 15 feet.

The calculation is as follows:

ISA =  $[2 \times (STORIES) \times (TSF), \text{ unless STORIES} = 0, \text{ then use } (TSF)] + \\[(Perimeter) \times 15, \text{ unless STORIES} = 0, \text{ then use } 0] + \\[(0.15 \times 15 \times (Perimeter), \text{ unless STORIES} = 0, \text{ then use } 0]$ 

The first term of the formula accounts for the floors and ceilings, the second term accounts for walls, and the third term accounts for interior partitions, which was assumed to be 15 percent of the perimeter area.

B3.10 EXTERIOR AND INTERIOR SURFACE AREA (EISA)

EISA was calculated based on the STORIES field from the Task 24 Database, and from the calculated value for PERIMETER described in Section B3.3. The calculation is as follows:

EISA =
[2 × (STORIES) × (TSF), unless STORIES = 0, then use (TSF)] +
[(Perimeter) × 15, unless STORIES = 0, then use 0] +

 $[0.15 \times 15 \times (Perimeter), unless STORIES = 0, then use 0] + [(TSF), unless (STORIES) = 0, then use 0] + [(Perimeter) <math>\times 15$ , unless (STORIES) = 0, then use 0]

The first term of the formula accounts for the floors and ceilings, the second term accounts for walls, the third term accounts for interior partitions, the fourth term accounts for the roof, and the fifth term accounts for the exterior wall area.

# B4.0 REFERENCES

RIC 88306R02

Ebasco Services Incorporated (EBASCO). 1988. Task 24 Structures Survey Final Report.

EPA - OERR. 1988, October. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. EPA/540/G-89/004. OSWER Directive 9355.3-01.

Appendix C
Costs

# TABLE OF CONTENTS

Section	<u>Page</u>
C1.0 INTRODUCTION	<b>C</b> -1
C2.0 COST ESTIMATE TABLES	<b>C</b> -1
C3.0 UNIT RATE DEVELOPMENT	C-5
C3.1 MOBILIZATION/DEMOBILIZATION	C-6
C3.2 NO ACTION AND INSTITUTIONAL CONTROLS	C-6
C3.3 DEMOLITION, BACKFILL, AND TRANSPORTATION	C-7
C3.4 STRUCTURES UNIQUE PROCESSES	C-8
C3.5 IN SITU THERMAL TREATMENT	<b>C</b> -10
C3.6 DIRECT THERMAL TREATMENT	<b>C</b> -10
C3.7 CONTAINMENT	<b>C</b> -10
C3.8 AGENT MATERIALS TREATMENT	C-11
C4.0 REFERENCES	C-12

# LIST OF TABLES

Table C-1	Cost Estimate-Future Use, No Potential Exposure Medium Group Alternative No. 1: No Action
Table C-2	Cost Estimate-No Future Use, Nonmanufacturing History Medium Group Alternative No. 1: No Action
Table C-3	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 1: No Action
Table C-4	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative 2: Pipe Plugs, Locks/Boards/Fences/Signs
Table C-5	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 8: Hot Gas, Dismantling, Salvage, On-Pos Nonhazardous Waste Landfill
Table C-6	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 9: Vacuum Dusting, Dismantling, Salvage On-Post Nonhazardous Waste Landfill
Table C-7	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 9a: Steam Cleaning, Dismantling, Salvage On-Post Nonhazardous Waste Landfill
Table C-8	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 10: Sand Blasting, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill
Table C-9	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative 12: Dismantling, Salvage, Off-Post Rotary Kill Incineration, Off-Post Hazardous Waste Landfill
Table C-10	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 13: Dismantling, Salvage, On-Post Rotary Kiln Incineration, On-Post Hazardous Waste Landfill
Table C-11	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 19: Dismantling, Salvage, On-Post Hazardous Waste Landfill

# LIST OF TABLES (Continued)

Table C-12	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 20: Dismantling, Salvage, Off-Post Hazardous Waste Landfill
Table C-13	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative No. 21: Dismantling, Salvage, Clay Cap
Table C-14	Cost Estimate-No Future Use, Manufacturing History Medium Group-Process History Subgroup, Alternative 21a: Dismantling, Salvage, Consolidation
Table C-15	Cost Estimate-No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup, Alternative No. 1: No Action
Table C-16	Cost Estimate-No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup, Alternative No. 2a: Locks/Boards/Fences/Signs
Table C-17	Cost Estimate-No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup, Alternative No. 19a: Dismantling, Salvage, On-Post Nonhazardous Waste Landfill
Table C-18	Cost Estimate-No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup, Alternative No. 20a: Dismantling, Salvage, Off-Post Nonhazardous Waste Landfill
Table C-19	Cost Estimate-No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup, Alternative No. 21: Dismantling, Salvage, Clay Cap
Table C-20	Cost Estimate-No Future Use, Manufacturing History Medium Group-Non-Process History Subgroup, Alternative 21a: Dismantling, Salvage Consolidation
Table C-21	Cost Estimate-No Future Use, Agent History Medium Group Alternative No. 1: No Action
Table C-22	Cost Estimate-No Future Use, Agent History Medium Group Alternative No. 4: Hot Gas, Dismantling, On-Post Hazardous Waste Landfill

# LIST OF TABLES (Continued)

Table C-23 Cost Estimate-No Future Use, Agent History Medium Group Alternative No. 6: Hot Gas, Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill Cost Estimate-No Future Use, Agent History Medium Group Table C-24 Alternative No. 14: Dismantling, On-Post Hazardous Waste Landfill Cost Estimate-No Future Use, Agent History Medium Group Table C-25 Alternative No. 15: Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill Table C-26 Cost Estimate-No Future Use, Agent History Medium Group Alternative No. 17: Dismantling, Hot Gas, On-Post Hazardous Waste Landfill Cost Estimate-No Future Use, Agent History Medium Group Table C-27 Alternative No. 18: Dismantling, Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill Table C-28 Cost Estimate-No Future Use, Agent History Medium Group Alternative 18a: Sand Blasting, Dismantling, Peroxide/Huypochlorite, On-Post Hazardous Waste Landfill

# LIST OF ACRONYMS AND ABBREVIATIONS

CY cubic yard

DAA Detailed Analysis of Alternatives

DSA Development and Screening of Alternatives

EPA U.S. Environmental Protection Agency

GRA General Response Action

LF linear foot

O&M Operations and Maintenance
PPE personal protective equipment
RMA Rocky Mountain Arsenal

SF square foot

UXO unexploded ordnance

#### C1.0 INTRODUCTION

This appendix contains the cost estimates for the alternatives retained from the Development and Screening of Alternatives (DSA) for structures at Rocky Mountain Arsenal (RMA). A total of 28 cost estimates were developed for the structures medium: 1 cost estimate each for the Future Use, No Potential Exposure and No Future Use, Nonmanufacturing History Medium Groups (Tables C-1 and C-2, respectively); 12 cost estimates for the No Future Use, Manufacturing History-Process History Subgroup (Tables C-3 through C-14); 6 cost estimates for the No Future Use, Manufacturing History-Non-Process History Subgroup (Tables C-15 through C-20); and 8 cost estimates for the No Future Use, Agent History Medium Group (Tables C-21 through C-28).

The following sections explain the format of the cost estimate tables and discuss the methodology used to develop the unit rates and indirect cost factors.

#### C2.0 COST ESTIMATE TABLES

The detailed cost estimates for the structures DAA are presented in Tables C-1 through C-8 of this appendix. They are organized in terms of three main groups, capital costs, operations and maintenance (O&M) costs, and long-term activities costs. Both capital and O&M costs may include both prime contracts and subcontracts direct costs, and associated indirect costs. Long-term costs may include prime contractor direct costs and associated indirect costs. If a cost did not apply to a given alternative, it was not included in the estimate. Under this organization, an individual cost table may contain up to ten subsections, including:

- Direct Capital Costs
- Indirect Capital Costs
- Direct Subcontract Capital Costs
- Indirect Subcontract Capital Costs
- Direct O&M Costs (Operations)
- Indirect O&M Costs (Operations)
- Direct Subcontract O&M Costs (Operations)
- Indirect Subcontract O&M Costs (Operations)
- Direct O&M Costs (Long-Term Activities)
- Indirect O&M Costs (Long-Term Activities)

Direct costs are those required to accomplish activities in the field. Direct capital costs are those incurred to prepare for remediation of structures, such as the construction of a landfill or incineration facility. Direct subcontract capital costs are costs incurred by specialty subcontractor for the construction of major treatment facilities such as an incineration facility. Direct O&M costs (Operations) are those costs incurred to actually remediate structures, such as demolition and placement of debris in a landfill. Direct subcontract O&M costs are operation costs incurred by these specialty subcontractors during treatment. O&M (Long-Term Activities) are those costs incurred for monitoring and/or routine maintenance after remediation is accomplished. An example of long-term O&M is monitoring and maintenance of a landfill.

Indirect costs are explained in Section C4.0. The elements of indirect costs may include:

- Mobilization/Demobilization
- Indirects, Overhead, and Profits; or Contractor Markup
- Engineering Design
- Resident Engineering
- Contingency

It should be noted, these estimates are structured solely to represent a comparative cost between site-wide alternatives and not as stand alone estimates. Caution should be exercised in comparing individual alternative costs such as engineering design; resident engineering; indirects, overhead, and profits since these costs represent only a comparative percentage of any individual alternative. Prior to implementation of the preferred alternatives developed in this document it will be necessary to re-evaluate the total estimated cost to provide a more detailed cost assessment.

The headings across the top of each cost estimate table are explained as follows:

### Cost Item:

Each horizontal line represents a unit operation and its associated direct cost. The cost item begins with a prefix designating which exceedance category the unit rate is addressing, e.g., agent, biota, human health, and/or unexploded ordnance (UXO).

# Cost Type:

There are two cost types indicated in this column: lump sum (LS) and annual (A). "LS" denotes a unit operation that occurs in only 1 year, while the "A" denotes the annual cost for a unit operation that occurs in more than 1 year.

## Start Year:

This column denotes the starting year for the unit operation. Cardinal numbers are used to specify the calendar year, with year 1 representing 1995.

## End Year:

This column denotes the ending year for the unit operation. Note that no ending year is specified for the lump sum cost type. Ordinal numbers are used to specify the calendar year with year 1 representing 1995.

# 1992 (\$) Unit Cost:

This column denotes the unit cost for the particular unit operation in 1992 dollars.

# Units:

This column denotes the units associated with 1992 (\$) Unit Cost.

## Quantity:

This column denotes the quantity for each unit operation.

#### Units:

This column denotes the units associated with Quantity.

## Volume Factor:

Where appropriate, this column denotes the Volume Factor, which accounts for any expansion or reduction of a volume quantity, e.g., expansion of in-place soil as it is excavated. The Volume

Factor equals 1.000 for cost items where volume changes are not expected, which has no effect on the computed costs. For structural debris, the following volume factors were assumed:

- After dismantling, when the debris would be in the largest pieces the equipment could handle, the volume factor is increased by 0.6,
- After shredding, the volume factor is reduced by 0.3,
- After placement and compaction in the landfill, the volume factor is reduced by 0.3,
- After incineration, the volume factor is reduced by 0.3.

## Mileage Factor:

The Mileage Factor specifies the round-trip mileage for each transportation cost item. The Mileage Factor equals 1.000 for all non-transportation cost items, which has no effect on the computed costs.

### Other Factor:

The Other Factor is reserved for miscellaneous factors for which it would have been wasteful of presentation space to include a separate column, e.g., odor control. The Other Factor equals 1.000 for all other cost items, which has no effect on the computed costs. Odor control costs were increased by 20 percent, i.e., an Other Factor of 1.2.

#### 1995 (\$) Annual Cost:

Annual costs are presented only for the O&M (Long-Term Activities) portion of the cost estimates. These values are for informational purposes only and they provide only an approximation of the annual cost of the O&M (Long-Term Activities) after waste treatment has been completed. Note that each cost item may be applied at different times, thereby rendering the sum of the annual cost an approximate figure.

#### 1995 (\$) Total Cost:

The Total Cost is given in 1995 dollars. It is calculated by multiplying the following:

• 1992 (\$) Unit Cost

- Quantity
- Volume Factor
- Mileage Factor
- Other Factor
- Single Payment Compound Amount Factor to convert the 1992 (\$) Unit Cost to a 1995 (\$) Unit Cost using a 5 percent discount rate. This factor equals 1.158.

### 1995 (\$) PW Cost:

The Present Worth Cost in 1995 dollars is calculated by applying the appropriate fraction of the 1995 (\$) Total Cost to the specified years, then discounting the applied value at each year back to Year 1 (1995) using a 5 percent discount rate.

Explanations for the calculations of subtotals and indirect costs are given on the cost estimate tables in the form of alphabetical references.

## C3.0 <u>UNIT RATE DEVELOPMENT</u>

This section describes how unit rates were developed for the individual line items. The cost information is derived from vendor information, cost estimating manuals such as MEANS, related project information, and engineering judgement. The cost of PPE is included in the unit costs. The level of PPE was determined based on the process being performed and the expected nature of the debris. The levels of protection ranged from level D to Level B. Production rates were adjusted based on the level of worker protection.

#### C3.1 NO ACTION AND INSTITUTIONAL CONTROLS

No Action line items do not involve any capital, operations, or long-term costs and indicate that no additional action is proposed for all or part of the site.

The Institutional Controls General Response Action (GRA) can involve several different line items. The estimated cost of security fencing is \$16.12/linear foot (LF) for the installation of

fence, a pedestrian gate, a swing gate, and signs at 200-foot intervals. The estimated annual maintenance cost for fences is estimated to be 10 percent of the installation cost, and the estimated cost of installing locks and boards includes the cost of boarding up all structure openings and restricting access using locks. The estimated capital cost for locks and boards is \$1.86/square foot (SF), with an annual maintenance cost of 10 percent of the capital cost.

## C3.2 DEMOLITION, BACKFILL, AND TRANSPORTATION

The Demolition line item covers site-specific activities such as dismantling structures and removing debris from a site, or dropping structures within a region so that they may be covered by an impermeable cover. Capital costs for demolition are covered under the Mobilization/Demobilization line item. The estimated operations cost for demolishing process and non-process buildings is \$11.02/cubic yard (CY) of the standing building volume. Demolishing structures with potential agent presence differs from demolishing process history structure because the former requires the inclusion of costs for roll-away containers and a truck capable of loading the containers for agent monitoring purposes. Moreover, preliminary containment of agent demolition materials is required for agent monitoring, which elevates the estimate cost to \$23.31/CY.

Shredding is the process of sizing structural materials, such as metal, brick, or concrete. Shredding will reduce the amount of void space between the rubble therefore making landfilling or consolidation more cost effective. Shredding will also improve the handling characteristics of the material and allow representative sampling. Estimated costs for shredding are \$0.31 and \$13.32 for the capital and operations cost, respectively.

Repair of agent and manufacturing structures is the process of shoring or supporting perceived or unperceived weaknesses in structural integrity. This is applicable for all structures designated for treatment, salvage, and dismantling. It is estimated that the process history structures will cost \$4.35/CY and agent history structures \$5.28/CY.

The dust and safety sampling line item covers the standard air monitoring necessary to monitor the effectiveness of dust and vapor emission controls. This will ensure the protection of both site workers and the community. The estimated operations cost for sampling is \$3.75/CY for manufacturing history structures.

Sampling of structures demolition debris is covered by four separate line items. The four line items covering structure debris sample are: Nonprocess History structures to be disposed in a nonhazardous landfill costing \$42.61/CY, Process History structures to be disposed in a nonhazardous landfill costing \$93.74/CY, Process and Agent History structures to be disposed in hazardous landfills costing \$213.05/CY, and Process and Nonprocess structures to be consolidated costing \$4.26/CY.

The Backfill line item covers the use of uncontaminated soils or other materials to fill holes created during the excavation of a structure. This process involves obtaining fill from uncontaminated on-post areas to backfill structural demolition/excavation sites, then compacting and grading the area. The estimated operations unit cost is \$8.05/CY. After backfilling, the area will be revegitated, where necessary, at a cost of \$0.08/SF.

The Transportation line items cover hauling demolition materials to on- or off-post treatment and disposal locations. The alternatives that involve transportation may consist of one or several different line items. The estimated operations costs for the off-post transportation of hazardous and nonhazardous material are \$0.19/CY•MILE and \$0.13/CY•MILE, respectively. The estimated operations costs for on-post transportation of hazardous and nonhazardous materials are \$1.07/CY•MILE and \$0.86/CY•MILE, respectively. There are two separate line items that cover the loading of debris prior to transporting. The estimated operations cost for loading hazardous debris is \$1.55/CY and \$1.28/CY for nonhazardous debris. The Transportation line items do not include capital costs, which were assumed to be covered in the Mobilization/Demobilization line item.

The Transfer station line item was employed to cover costs for a loading facility. This facility would transfer structural materials to off-post hauling vehicles. The estimated capital cost of this facility is \$0.24/CY with a operating cost of \$0.41/CY.

# C3.3 STRUCTURES UNIQUE PROCESSES

The Structures Unique Processes line items cover treatment and action alternatives that apply only to the structures media. Capital and operations costs for treatment-based line items are based on the assumption of having enough equipment to clean the entire applicable surface area within 1 year. Structures Unique Processes line items include steam cleaning, sand blasting, vacuum dusting, pipe plugging, and salvage.

Steam cleaning is the process of removing contamination from building materials and equipment surfaces using heated water applied under pressure (EPA 1985). The estimated capital cost for steam cleaning is \$0.29/SF and the operations costs are \$1.84/SF. These line item costs include treatment unit purchase, labor, personal protective equipment (PPE), an accompanying water treatment system, system maintenance, and miscellaneous costs.

Sand blasting is a mechanical-scour treatment that involves the use of an abrasive such as sand or steel pellets to uniformly remove layers of superficial contamination (Battelle 1983). The estimated capital and operations unit costs for sand blasting are \$0.38/SF and \$2.75/SF respectively. Line item costs include treatment unit purchase, labor, PPE, an abrasive recycling system, system maintenance, and miscellaneous costs.

Vacuum dusting refers to the removal of superficial contamination using suction. The estimated capital cost for vacuum dusting is \$0.03/SF which covers unit purchase costs, initial PPE, and other costs required to begin work. The estimated operation costs covering the system maintenance, labor, and miscellaneous costs are estimated at \$1.02/SF.

Pipe plugging is the in situ solidification of contamination within a pipe to reduce contaminant mobility. The estimated operations costs were based on pipe diameter ranges to show the contrast in costs incurred by plugging differently sized pipes. Pipe volumes corresponding to the pipe plugging unit costs were calculated by dividing the Task 24 database totals by 10 percent and then multiplying by 60 percent. This algorithm changes collapsed pipe volume to standing pipe volume. The estimated operations costs estimate are \$9,960/CY for pipe diameters of 2 inches or less, \$2,119/CY for diameters ranging from 2 to 6 inches, and \$678/CY for diameters of 6 inches or more. These cost estimates include labor, setup time, move time, pumping time, rental costs, and operations material cost.

Metals salvage is the recycling of uncontaminated materials such as nonprocess equipment and structural metals from nonprocess history structures, or decontaminated process equipment and piping from Process History structures. Salvage of metals has an estimated cost return of \$52.61/CY.

#### C3.4 IN SITU THERMAL TREATMENT

The in situ thermal treatment alternative involves hot gas treatment. This process heats materials to temperatures of 750°F, releasing adsorbed contaminants and directing them to an off-gas treatment system. Costs were developed for both manufacturing and agent history structure. For Manufacturing and Agent History structures the estimated capital cost for hot gas is \$0.81/SF, which includes the purchase of the treatment system, building closure materials, and labor for the closure of the room/building prior to treatment. The estimated operations cost for Manufacturing History structures is \$12.49/SF and \$15.96/SF for Agent History structures. These costs include treatment, fuel, and oversight during treatment.

## C3.5 DIRECT THERMAL TREATMENT

The direct thermal treatment alternative involves off- and on-post rotary kiln incineration, i.e., the controlled combustion of organic wastes under oxidizing conditions. The treatment may also

partially volatilize some inorganics, so afterburners and scrubbers are used to treat off-gas emissions.

The off-post incineration line item cost estimate includes the cost of transportation to the facility and subsequent incineration. The operation costs are \$4,110/CY.

On-post incineration capital costs estimates include the cost of purchasing a rotary kiln incinerator, afterburner, and scrubbers, which are assessed at \$34.53/CY. The estimated labor, fuel, maintenance, and other operations costs are \$133.31/CY.

## C3.6 CONTAINMENT

Containment activities that require unit cost assessment are off- and on-post hazardous and nonhazardous waste landfills, on-post consolidation of materials in Basin A, and the use of capping of demolition materials within a region.

The On-Post Landfill line item costs were estimated based on the costs contained in the Task 27 report (EBASCO 1988b). The Task 27 report contains a detailed analysis of the size and costs incurred by the construction, operation, and long-term maintenance of the conceptual landfill. (For additional information, see Appendix B of the Soils DAA.) Unit cost estimates derived in the Task 27 report include a capital cost estimate of \$5.72/CY for hazardous landfills and \$4.32/CY for nonhazardous landfills. Procedures for operating and monitoring a hazardous and nonhazardous landfill are nearly identical; therefore, operations costs were estimated at \$3.65/CY for both types of on-post landfill; long-term costs were assessed at \$0.13/CY. The capital cost of landfill closure is \$3.80/CY for the hazardous waste landfill and \$3.70/CY for the nonhazardous waste landfill.

The Off-Post Landfill line item was estimated based on current rates quoted by current hazardous and nonhazardous landfill operators. These estimates are notably higher in the operations cost

category, but involve no capital or long-term monitoring unit costs. The estimates for operations unit cost for hazardous and nonhazardous landfills are \$76.00/CY and \$4.50/CY, respectively.

The Consolidation line item covers the process of sizing, spreading, and compacting materials in a centralized location. Basin A is currently the selected location for consolidation of structural and other materials. The estimated operations costs are \$7.26/CY. No capital or long-term costs were assumed.

The Capping line item covers capping structural demolition debris in place covered with a layer of clay and soil. Estimated costs for capping include a \$2.06/SF for operations cost and \$0.09/SF for long-term monitoring. The cost for revegitating the capped area is \$0.38/SF. In addition, a 5-year site review will be performed at a cost of \$5,400/YR.

### C3.8 AGENT MATERIALS TREATMENT

Several treatment alternatives that were specifically chosen for agent-contaminated structures involve treating contaminated materials with a peroxide/hypochlorite caustic wash, sampling large containers of demolition materials with agent-monitoring equipment, and performing real-time air monitoring at the site.

The Peroxide/Hypochlorite line item covers treating agent contamination with a 1 to 3 parts mixture of hypochlorite and peroxide. The estimated capital cost, \$175.22/CY, includes building a facility in which to treat the waste, initial chemicals costs, and other preliminary costs. The estimated operations costs for this process are \$109.40/CY and cover chemical costs, labor costs, and facility maintenance.

The Agent Monitoring line item covers the determination of whether structural materials need to be treated by agent treatment methods. Agent monitoring is accomplished by placing demolition materials in covered roll-away containers and sampling the contents for agent. The estimated capital cost for this line item is \$2.29/LS, with an operations cost of \$22.53/CY.

The Air Sampling line item covers the costs involved in taking real-time and environmental air samples in proximity to the demolition sites with potential agent presence. Capital and operations cost estimates rely upon the equipment required to ensure accurate detection of any airborne contamination. The estimated operations cost is \$2,940,789/YR.

## C4.0 INDIRECT COSTS

Indirect costs are applied to the sum of the three main cost groups which include direct capital costs, direct O&M costs, and direct O&M long-term activities costs. To better evaluate and estimate the indirect costs, the capital and O&M operating costs were subdivided between direct costs and direct subcontract costs. The indirect costs include:

- Mobilization/Demobilization
- Indirects, Overhead, and Profit; or Contractor Markup
- Engineering Design
- Resident Engineering
- Contingency

The indirect costs vary due to the four consideration factors: medium group contamination; technologies selected; size of the project; and the duration. Based on the characteristics of each alternative as it is applied to the medium group, these factors assist in the development of indirect percentages as explained below. These indirect percentages are then applied to the direct costs to determine an overall total cost.

In order to provide a uniform basis of estimate, a cost markup matrix was developed based on the consideration factors to determine indirect costs percentages for direct capital and O&M costs. This matrix is presented as Table C4.0-1. Percentages for these estimates have been modified to distinguish relative cost differences between on-post and off-post activities and subcontracts. In some instances these factors were individually adjusted to be more representative of the individual alternative's complexity. The following sections explain the indirect markup factors and the application rationale.

#### C.4.1 MOBILIZATION/DEMOBILIZATION

Mobilization activities include construction/setup of contractor's support facilities, mobilization of heavy equipment, and relocation of management/supervisory personnel. Demobilization consists of decontamination and removal of contractor's equipment and facilities from the site. Costs for these activities are applied as a percentage of direct cost. These percentages applied vary from 2-7 percent as shown in markup matrix. For subcontract costs these percentages have been adjusted on a case-by-case basis, based on vendor quotes, and past knowledge and experience with similar projects.

# C.4.2 INDIRECTS, OVERHEAD, AND PROFIT; OR CONTRACTOR MARKUP

Indirect Costs are calculated as a percentage of the sum of direct and mobilization/demobilization costs. Indirect costs cover the cost of on-site management, administrative, technical, health and safety, and supervisory staff, utilities for site support facilities (excluding production facilities), engineering tests, QA/QC program, preparation of work plans, submittals and as-built drawings, bonding costs, support facilities, and vehicle maintenance and operation. The range of percentages applied vary between 34-44 percent.

Subcontract cost for Indirects, Overhead, and Profit is identified as a Contractor Markup in the estimates and includes on-site management, administrative, technical, health and safety, supervisory staff, and subcontract profit. The Contractor's Markup ranged from 6-12 percent.

#### C.4.3 ENGINEERING DESIGN

The engineering design costs are estimated as a percentage of the sum of direct costs; mobilization/demobilization costs; and indirects, overhead, and profits. In general, engineering percentages were developed based on past experience of engineering costs on similar projects. These percentages are dependent upon the degree of complexity associated with the particularly alternative and the complexity of the treatment technology selected. Standard percentages ranging between 3-6 percent are applied to the estimates, however, certain alternatives required adjustments to reflect extenuating circumstances in the required design effort and were adjusted accordingly.

#### C.4.4 RESIDENT ENGINEERING

The resident engineering costs are estimated as a percentage of the sum of direct costs; mobilization/demobilization costs; and indirects, overhead, and profits. The alternative size, estimated project duration, and the remedial technology selected would determine the level of effort required for inspection and field engineering support to assure conformance and verification with the approved remedial design. Standard percentages ranging between 1-3 percent are applied to the estimates.

#### C.4.5 CONTINGENCY

Contingency is applied as a percentage of the sum of direct costs; mobilization/demobilization costs; indirects, overhead, and profits; and design and resident engineering costs. Contingency covers the specific provisions for unforeseeable elements of costs within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur. To effectively compare the design alternatives contained in this document, contingency has been applied to each alternative estimate based on the complexity of the treatment technology, unforeseen and unpredictable conditions, and/or uncertainties within the scope of this project. Other considerations which may affect the selection of contingency are levels of contamination; environmental media and climatic conditions; scheduling; changes in federal, state, or local regulations, and other issues unique to the project such as waste management permits and regulatory reviews.

Separate contingencies were developed for capital cost, operation and maintenance cost, and long-term activities which are illustrated in the markup matrix. A contingency range for this level of detail is typically 20-50 percent, which was for these estimates. The contingency to be provided for the current estimates was developed based on four cost parameters considered for each cost type, including levels of contamination, the complexity of the treatment technology, the size of the project, and the estimated duration of the activity. The amount of contingency applied to the

estimates in this document ranged between 25-40 percent based on these consideration factors and on past experience and knowledge with similar remedial projects.

# C5.0 REFERENCES

## RIC87026R01

- EBASCO. 1988b, September. Final Report Hazardous Waste Land Disposal Facility Assessment, Task 27. Prepared for Program Manager's Office for Rocky Mountain Arsenal Contamination Cleanup.
- Battelle 1983. Development of Navel Decontamination and Inerting Techniques for Explosives Contaminated Facilities. Phase I Identification and Evaluation of Navel Decontamination Concepts. DRXTH-TE-CR-83208. Prepared for U.S. Army Toxic and Hazardous Materials Agency.
- EPA (U.S. Environmental Protection Agency). 1985, March. Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites. Prepared by PEI Associates, Incorporated, and Battelle Columbus Laboratories. EPA/650/2-85/028, NTIS PB85-20123Y.

Table C-1 Cost Estimate - Future Use, No Potential Exposure Medium Group Alternative No. 1: No Action

			Cost Start End	art End	1992 (\$) 17air Coet Units	Ouantity Units	Volume Mileage Factor Factor	Other Factor Description	1995 (\$) Amual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS No Action				1 0	0.00 /EA	1 EA	000'1 000'1 000'1			0	0
										·	ć
		Subtotal (A)							ı	0	
INDIRECT CAPITAL COSTS	8	COST CODE	2							0	o
Indirects, Overhead & Profit	90.0	C = 0.000 * (A+B)								0	0 (
Engineering Design	90.0	D=0.000*(A+B+C)								0 0	00
Hesident Engineering Confingency	9600 9600	E = 0.000 * (A+B+C+D+E)								• •	0
		Subtotal (G =B+C+D+E+F)							1	0	0
TOTAL CAPITAL COSTS (H = A+G)										0	0
FUNDEP-1 WOI											07-Jul-93
STRUCTURES DAA											

Table C-1 Cost Estimate - Future Use, No Potential Exposure Medium Group
Alternative No. 1: No Action

Alternative No. 1: No Action											
	0	Cost Start	End	1992(\$) Unit Cod Units	Ouantity Units	Exp/Red Mileage Factor Factor	Other Factor Description	cription	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
Lost Irem DIRECT O&M COSTS (OPERATIONS) No Action			1	0.00 ÆA	<b>2</b>	1.000 1.000	l			0	0
OSTS (OPERATIONS) 0.0% rhead & Proft 0.0% besign 0.0% intering 0.0%	Subrital (1) COST CODE J = 0.000 * (1) K = 0.000 * (1-4-14) M = 0.000 * (1-4-14) M = 0.000 * (1-4-14) M = 0.000 * (1-4-14)	2								0 0000	0 0000
	Suktotal (O = J+K+L+M+N)	0	;	0.00 /EA	l EA	1.000 1.000	1.000		6	0 0	0
	Subtotal (P)							İ	0	0	0
INDIACT OGNICOSTS (LONG-TEHIN ACTIVITIES) Indirects, Overhead & Proft 0.0% Q = C Contrigency 0.0% R = 0	Q = 0.000 * (P+Q)	ų.							00	0 0	00
	Subtotal (S)							1	0	0	0
TOTAL ORM COSTS (T = 1+0+P+S)   Note: Total ORM Annual Cost Only Includes Long, Term Activities	nual Cost Only Includes L	ong-Term	Activities					i i	0	0	0
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS ( $U = H + D$	Ū,									0	0
FUNPEP-I,WQI STRUCTURES DAA											07-Jul-93

Table C.2 Cost Estimate - No Future Use, Normanufacturing History Medium Group Alternative No. 1: No Action

Cost Iren		Cast Tvpr	Start	End Year	1992 (\$) Unit Cost Units	Quantity Units	Volume Mileage Other Factor Factor Factor	age Or	Other Factor Description	1995 (\$) Annuel Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS No Action		0	0	:	0.00 ÆA	43 -	1.000 1.000 1.000	000	8		0	0
	Subtotal (A)	<b>(</b> )									0	9
INDRECT CAPITAL COSTS MobDemob Indicate Combod & Brida	COST CODE  0.0% B = 0.000 * (A)	2									00	• •
Engineering Design Resident Ergineering Contingency											000	000
	Subtotal (G =B+C+D+E+F)	4.E4F)								ļ	0	0
TOTAL CAPITAL COSTS (H = A+G)			İ								0	9
NFUNM-1,WQI STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Normanufacturing History Medium Group Alternative No. 1: No Action

COST COST COST COST COST COST COST COST	Cost liem	0	Cost Start I	Find	1992 (S) Unit Cost Units	Ovanity Units	Exp'Red Mileage Other Factor Factor Factor Description	1995 (\$) n Annual Cost	1995 (\$) Totel Cost	1995 (S) PW Cost
Selected (1) 2  SST CODE  2 2  0 10  0 10  Selected (A)  S	DIRECTOR M COSTS (OPERATIONS) No Action		0	:	0.00 /EA	1 EA			0	0
Substal (f) 2 2 0.00 2 0.00 2 0.00 3										
Subtotal (f) 2  Subtotal (f) 2  Subtotal (g) 2  Subtotal (g) 2  Subtotal (g) 3  Cert Conty Incideds Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Conty Incided Lings Trem Activities   0  Cert Cont										
(0 = 3+K+1-M+N)   0   0   0   0   0   0   0   0   0		Subotal (1)  COSTOODE  J = 0.000 * (1, -1)  K = 0.000 * (1, -1, +1)  L = 0.000 * (1, -1, +1)  M = 0.000 * (1, -1, +1)  N = 0.000 * (1, -1, +1, +1, +1, +1, +1)	2						0 0000	0 0 0 0 0
Subtotal (P)  CST CODE  Z  OO* (P)  OO* (P-Q)  Subtotal (S)  Cost Only Includes Long Term Activities   Cost Only Includes Long Term Activities	DIRECT O&M COSTS (LONG-TERM ACTIVITIES) No Action			;	0:00 /EA	1 EA	000'1 000'1 000'1		0	0
Subtotal (P)  OST CODE  20 * (P)  00 * (P)  10										
Subtotal (S)  Cost Only Includes Long-Term Activities   0 0 0 0 0 0	INDIRECT ORM COSTS (LONG-TERM ACTIVITIES) Indirects, Overhead & Proft Contingency 0.0%	Subtotal (P)  COST CODE  Q = 0.000 * (P-Q)  R = 0.000 * (P-Q)	Z					0 0	0 0	0 0
Cost Only Includes Long-Term Activities   0 0		Subtotal (S)						0	0	0
	TOTAL O&M COSTS (T = 1+0+P+5) [Note: Total O	& M Annual Cost Only Includes L	ong-Term Activit	fics				0	0	0
	TOTAL CAPITAL COSTS AND TOTAL O&M COSTS NFUNM-1.WO! STRUCTURES DAA	(U=H+T)								07-Jul-93

Table C-3 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 1: No Action

Cost Item		Cest Start Type Year	Start End Year Year	1992 (\$) Unit Cost Units	Quantity Units	Volume Mileage Factor Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS No Action		0	0	0.00 /EA	l EA	1.000 1.000	1.000		0	0
									Ó	ć
	Subtotal (A)	(¥)							0	
INDIRECT CAPITAL COSTS MobDemob	0.0% B = 0.000 * (A)	7							0	0
Indirects, Overhead & Profit									00	
Resident Engineering		٥							0 0	00
Contingency	U.U. F = JU.UUU" (A+B+C+U+E)	í) <del>t</del>							•	•
	Subtotal (G =B+C+D+E+F)	Ę+F)						l	0	0
TOTAL CAPITAL COSTS (H = A+G)									0	0
PH-01.WQ1										07-Jul-93
STRUCTURES DAA										

Table C-3 Cost Estimate - No Future Use. Manufacturing History Medium Group - Process History Subgroup Alternative No. 1: No Action

Cost Item		Cost Start Type Year	rt End ar Year	nd	1992 (\$) Unit Cost Units	Ouantity Units	Exp/Red Mileage Factor Factor	Other Factor Description	1995 (\$) ion Annual Cost		1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT ORM COSTS (OPERATIONS) No Action				:	0.00 /EA	- -	1.000	<b>!</b>			0	0
INDIRECT O&M COSTS (OPERATIONS) MobDomorb Indirects, Overing Bright 0.0% 1 Engineering 0.0% 1 Resident Engineering 0.0% 1 Contringency 0.0% 1	Suheral (1)  COST CODE  J = 0.000 * (1)  K = 0.000 * (1)  L = 0.000 * (1-J+K)  M = 0.000 * (1-J+K)  N = 0.000 * (1-J+K+L+M)	N							4.		0 00000	0 0000
S DIRECT OR M COSTS (LONG-TERM ACTIVITIES) No Action	Suchocial (O = J+K+L+M+N)	0	; Q	;	0.00 EA	<u>5</u> -	1.000 1.000	1.000		0	0 0	0 0
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES) Indirects. Overhead & Proft 0.0% Confingercy 0.0% F	Subtotal (P)  COST CODE  G = 0.000* (P)  H = 0.000* (P+Q)	2								0 00	0 00	0 00
A A COLOR OF THE C	Subtotal (5)	ŀ	3	•								
TOTAL DARM COSTS (T.= 1+0-1+1-5).   Note: Total DARM Annual Cost Unity Includes Long. Term Activities). TOTAL CAPITAL COSTS AND TOTAL D&M COSTS (U.= H+T).	4 Annual Cost Uniy Includes L J = H+T)	ong- Icm	Activitie	S							0	
PH-01.WQI STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 2: Pipe Plugs, Locks/Boards/Fences/Signs

			Cost Start	-	End	1992(\$)		Volume Mileage		Other	1995 (\$)	(\$) 5661	1995 (\$)
Cost Item			Type		rar	Unit Cost Units	Quantity Units	Factor Factor		Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS										;		000	
Locks & Boards			S	_	:	1.86 /SF	379,291 SF			1.000		905,000	000,000
Fences & Signs			ដ	-	1	16.12 ALF	57,102 LF	1.000 1.	1.000	1.000		1,050,000	1,050,000
							•						
		Subtotal (A)	•									1,855,000	1,855,000
INDIBECT CAPITAL COSTS		COSTCODE	1155										
MohDemoh	33%	B = 0.033 * (A)								•		60,000	000'09
Indirects Overhead & Proff	36/08	C = 0.390 * (A+R)										747,000	747,000
Freingearn Decim	306	D=0.030*(A+B+C)										80,000	80,000
Desident Conjuga	1 300	E-0013*(A.B.C)										33,000	33,000
Continuency	85.38 36.38	F = 0.263 * (A+B+C+D+E)	G									729,000	729,000
Contract to	8 C:53	- 0.500 (mm)	7										
		Subtotal (GBuC. C. C. C. F. F.	a									1,619,000	1,6-19,000
			•										
TOTAL CAPITAL COSTS (H = A+G)												3,505,000	3,505,000
PH-02.WO1													07-Jul-93
STRUCTURES DAA													

Table C-4 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 2: Pipe Plugs. Locks/Boards/Fences/Signs

		Set Start	1	Fnd	1997 (\$)	:	Frn/Red Mileson		Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item	, ,			ļ.	Unit Cost Units	Quantity Units	Factor Factor		Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT O&M COSTS (OPERATIONS) Pire Plucine - III <= 7 in		•		,	4 960 00 /CY	134 CY	1.000	1	000		3,795,000	3,705,000
Pine Plugging - 2 in. < ID <= 6 in.		< ∢		. 2	2119.00 /CY	3,673 CV	1.000.1		1.000		8,882,000	8,670,000
Pipe Plugging - ID > 6 in.		<	-	2	678.00 /CY	2,671 CY			1.000		2,067,000	2,018,000
CAROLE A CTRICK OFFICE A SECURITION OF TOTAL SECURITION OF THE SEC	Subtotal (I)	9								1	14,743,000	14,392,000
5.18	.J=0051*@	C AIM									756,000	738,000
erhead & Profit 40.3%	K = 0.403 * (I+J)										6,238,000	6,090,000
4.5%	L = 0.045 * (I+J+K)										978,000	955,000
Resident Engineering 2.0% N	M = 0.020 * (1+J+K) M = 0.213 * 0.1.K.1.M.										435,000	7.062.000
KC.10	N = 0.313 - (I+J+N+L+M)										00016	2001-2001
	Subtotal (O = J+K+L+M+N)										15,641,000	15,269,000
DIRECT ORM COSTS (LONG-TERM ACTIVITIES)				9	i.	10.00			900	600	304 000	135000
Locks & Boards Fences & Signs		< <	2 C	30 %	0.19 SF 1.61 /LF	57,102 UF	000:1	8 89	1.000	105,000	3,042,000	1.588.000
	Subtotal (P)									187,000	5,427,000	2,834,000
TERM ACTIVITIES)	) ) (	ารา									500 2 5 6	000 501 1
Indirects, Overhead & Profit 39,0% C Contingency 30,0% F	G = 0.300 * (P+Q) R = 0.300 * (P+Q)									78,000	2,263,000	1,182,000
	Subtotal (5)									151,000	4,380,000	2,287,000
									l			
TOTAL OR M COSTS (T = 1+0+P+S) [Note: Total OR M Annual Cost Only Includes Long-Term Activities]	Annual Cost Only Includes L	ong-Term	Activiti	ا <u>ج</u>						338,000	40,192,000	34,782,000
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (U = H+T)	= H+T)										13,700,000	38,300,000

07-Jul-93

PH-02.WQ1 STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 8: Hot Gas, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill

Subtoral (A)  COST CODE  B = 0.045* (A+B)  D = 0.065* (A+B+C)	Cost Start End	1992(\$)		Volume Mileage	rage Other	1995 (\$)	1995 (\$)	1995 (\$)
NPTAL COSTS  Is for Manufacturing Structures  In Gauge Caregory Waste Landfill Gosure  Subtonia! (A)  CAPITAL COSTS  CAPITAL COSTS  CAPITAL COSTS  COST CODE  A 558  B = 0.045* (A)  Subtonia! (A)  Subtonia! (A)  Subtonia! (A)  Emb.  COST CODE  A 558  B = 0.045* (A)  Subtonia! (A)	Year Year	Unit Cost Units	Quantity Units	Factor Fa	Factor Factor Description	Annual Cost	Total Cost	PW Cost
15. 14. 15. 15. 16. 16. 16. 16. 16. 16. 16. 16. 16. 16							1	
113 /aste Landfill Gosure  Subtotal (A)  COSTCODE  4.5% B = 0.045 * (A)  Off 37.8% C = 0.378 * (A+B)  6.5% D = 0.065 * (A+B+C)	-		2,528,668 SF	_	_		2,337,000	2,337,000
/aste Landfill Crosure  Subtrotal (A)  COST CODE  4.5% B = 0.045* (A+B)  off 37.9% C = 0.378* (A+B)  6.5% D = 0.065* (A+B+C)	-		78.394 CY	1.000	0001 0001		28,000	28,000
Subotal (A)   COST CODE	-	4.32 /CV	72,588 CY	1.000	1.000 1.000		358,000	358,000
Subtorial (A)  COST CODE 4.5% B = 0.045 * (A+B) off 37.8% C = 0.378 * (A+B) 6.5% D = 0.065 * (A+B+C)	, L	3.70 /CY	72,588 CY	1.000	.000 1.000		306,000	278,000
COST CODE 4.5% B=0.045*(A) of 37.8% C=0.378*(A+B) 6.5% D=0.065*(A+B+C)						ļ	3,029,000	3,001,000
37.8% 37.8% 6.5%							136,000	135,000
6.5%							1,195,000	1,184,000
							283,000	281,000
							76,000	76,000
30:0%							1,416,000	1,403,000
Subtotal (G =B+C+D+E+F)							3,107,000	3,078,000
TOTAL CAPITAL COSTS (H = A+G)							6,137,000	6,079,000

PH-08.WQI STRUCTURES DAA

07-Jul-93

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 8: Hot Gas, Dismantling, Salvage, On-Post Nonhazardous Waste Landfill

		Cost Start	rt End	-	1992 (\$)		Exp/Red Mileage	Aileage	Other	1995 (\$)	1995 (\$)	(\$) 5661
Cost Rem				ă	Unit Cost Units	Quantity Units	Factor		Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT O&M COSTS (OPERATIONS)												
Dust & Safety Samp of Manuf Structures		<		_	3.75 /CY	631,646 CY	1.000	90.	1.000		2,703,000	2,703,000
Repair of Manufacturing Structures		<	_	_			000	1.000	0001		3,130,000	3,130,000
Hot Gas for Manufacturing Structures		∢	_	2			1:000	900	1.000		36,041,000	55,185,000
Demolition		<	_	~			1.000	90.			7,943,000	000,172,
Loading Nonbazardous Debris		⋖		е.	1.28 /CV	78,394 CY	1.600	000	1.000 Expansion		183,000	175,000
Transportation of Nonhazardous Waste On-post		< ⋅		ς,		78 304 (1	009.1	8			1 907 000	1.817.000
Shredding Structure Debris		۷ ۰		٠.			000.1	3 5	1.000 Expension		10.094.000	0001796
Debris Sampling, Process, Nonbaz Disposal		۷	_	•			005.1	3 8			0001500101	131,000
Loading Nonbazardous Debris		۷٠		<b>~</b> •	1.28 /CY	72, 588, CT	1.300	8 8	1.000 Expansion Miles		370.000	151,000
Transportation of Nonhazardous Waste Un-post		₹ .		•			000.	3 5			337,000	321 000
On-post Nonbazardous Waste Landfill		<	_	٠,			0001	3 8	000.1		000,000	305,000
Backfill of Structure Excavation		< ⋅		٠,	8.05 /CY	3,268/ CY	000.	80.	000.1		300,000	3000
Restoration of Structure Excavation		<	_	•		37(8) 73	200:1	3	000:1			
											000 017 17	000 011
	Subtotal (I)									1	03,646,000	91,7,4,000
DIRECT OAM BENEVINGS (OBED A TIONS)												
Salvage of Metal		∢	_	*	(52.61) /TON	NOT 701/86	1.000	1.000	1.000		(2,306,000)	(2.198,000)
ı												000
	Subtotal (I')									İ	(2,306,000)	(2,198,000)
MODELLO CONTRACTOR (OPERATIONS)	COSTODE	MM WST										
2.0%	J=0.020*(I)										1,273,000	1,235,000
erhead & Profit 37.8%	K = 0.378 * (I+J)										24,508,000	23,784,000
960'0	L = 0.000 * (I+J+K)										000 081 •	000 217 1
ineering 2.0%	M = 0.020 * (I+J+K)										77 365 000	26.558.000
	N = 0.300 (I+J+K+L+M)											
	Subtotal (O = J+K+L+M+N)	Ē								ŀ	51,931,000	53,313,000
S)					;	0.00	•	8			000	000 831
On-post Nonhazardous Waste Landfill Closure		<	m. ⊷.	30	0.13 /CY	72388 CY	1.000	300	1.000	000,11	000±000	OON'S CT
	Sulderial (P)								•	11,000	302.000	153,000
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES)	COSTCODE	LLSI.										!
	Q = 0.390 * (P)									900,	118,000	90,000
Confingency 30.0%	$R = 0.300 \cdot (P+C)$									900**	00000	3
	Subtobal (S)								1	000'6	243,000	123,000
TOTAL ORM COSTS (T = 1+1"+0+P+S) [Note: Total OR M Annual Cost Only Includes Long-Term Activities]	O&M Annual Cost Only In	cludes Long-	Tenn Act	tivities						19,000	116,821,000	113,161,000
C.II II. TOO TAND TANDED LAND TO LAND TO LAND	m-11.75										123.000.000	119,000,000
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (C	(0=11+1)											
PH-08.WQ1												07-Jul-93
STRUCTURES DAA												

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 9: Vacuum Dusting. Dismantling. Salvage. On-Post Nonhazardous Waste Landfill

		Cost Start	1	End	1992 (\$)		Volume Mileage	1	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost ltcm		Турс		rear	Unit Cost Units	Ovantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS												
Vacuum Dusting		S	-	;		503,652 SF	1.000	8	1.000		000'/1	000'/1
Shredding Structure Debris		S	_	:		78,394 CY	000.	<u>6</u>	0001		78,000	28,000
On nort Number ordense Waste Landfill		5	-	;		72,588 CY	1.000	000.1	0001		358,000	358,000
On-post Nonhazardous Waste Landfill Closure	4	I.S		1	3.70 /CY	72,588 CY	1.000	000.1	0001		306,000	278,000
											000 002	000 100
	Subtotal (A)	2									000,507	001,000
THE COOK STATE OF THE PARTY OF	300013000	3074										
Sign	0	CANCO									27,000	26,000
											287.000	276,000
Profit	39.0% C=0.390*(A+B)										46,000	41,000
Engineering Design 4.5											00051	15,000
	1.5% E = 0.015 * (A+B+C)									•	00000	000
Contingency 27.5%	5% F = 0.275 * (A+B+C+D+E)	Œ)									000,462	78 / 000
											900	900
	Subtotal (G =B+C+D+E+F)	Ē								į	000,570	044000
											1.384.000	1.329,000
TOTAL CAPITAL COSTS (H = A+G)								l				
BIL00 WOL												07-Jul-93

PH-09,WOI STRUCTURES DAA

Table C-6 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 9: Vacuum Dusting, Dismanling, Salvage, On-Post Nonhazardous Waste Landfill

			1	End	1992 (\$)	Ouentier L'hire	Exp/Red Mileage Factor Factor	Mileage	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
Cost Item		Type Treat	1	rear	Unit Cost Units	Cuantity Cities	1 4440					
DIRECT OR M COSTS (OPERATIONS)											2000 000	7 620 000
Dust & Safety Samp of Manuf Structures		∢ ·		7 1	3.75 /CV	631,646 CV	000	3 5	00:1		3 136 000	1061.000
Repair of Manufacturing Structures		∢ ·		7			90:	3 5	200		286,000	577 000
Vacuum Dusting		∢ ·	_	7 -			8	3 5	0001		7 943 000	7 \$71 000
Demolition		<	_	•			000.1	8 6	_		0001001	000 37.1
Loading Nonhazardous Debris		<	_	•			1.600	90.1			100,000	469,000
Transportation of Nonbazardous Waste On-post		∢	_	•			1.600	30.7			492,000	000,504
Shredding Structure Debris		<	_	€.	13.32 /CY		1.600	000	-		1,907,000	1.817,000
Debris Samuling Process, Nonhaz Disposal		<	_		93.74 /CY	72,588 CY	1.300	1.000	1.000 Expansion		10,094,000	9,621,000
Constant transfer to the constant to the const		: <				77 588 CY	1.300	1.000	1.000 Expansion		138,000	131,000
Loading Nonhazardous Debns		< <		. "			300	4000			370,000	353,000
I ransportation of ivondazardous waste on-post							2	5			337,000	321 000
On-post Nonhazardous Waste Landfill		<	_	•			(XX)	3	0001		000,000	300,000
Backfill of Structure Excavation		<	_				000.	000.	1.000		300,000	780,000
Restoration of Structure Excavation		۷	_		0.08 /SF	32,687 CY	1.000	1.000	1.000		3,000	3,000
	Subtotal (I)									ļ	28,193,000	27,020,000
DIPECT OF M DEVENIES (OPERATIONS)												
Salvane of Metal		<	_	"	(52.61) /TON	38,407 TON	1.000	1.000	1.000		(2,306,000)	(2,198,000)
Salvage of Medal		:		,								
	Subtotal (I')									1	(2,306,000)	(2,198,000)
OSTS (OPERATIONS)	∞ST∞0E	MIMEMIST									3	200 000
	J = 0.020 * (l)										304,000	200,000
& Profit 37.8%	K = 0.378 * (I+J)										10,856,000	10,404,000
%0:0	= 0.000 * (I+J+K)										000.602	759 000
jineering 2.0%	M = 0.020 * (I+J+K)										12 122 000	11.617.000
Contingency 30.0% N :	N = 0.300 " (I+J+K+L+M)											
Ġ	84.94. 1. V. I - C. Leaves. 0	9									24,334,000	23,321,000
SUCE CATOM COSTS A ONG TERM ACTIVITIES	30000al (U = J+N+L+M+	<del>?</del>								ļ		
On-post Nonhazardous Waste Landfill Closure		⋖	٠.	30	0.13 /CV	72,588 CY	1.000	1.000	1.000	11,000	302,000	153,000
										;		
	Subtotal (P)								1	11,000	307,000	153.000
TERM ACTIVITIES)	COST CODE	HSL								80.7	000 811	000 09
erhead & Profit 39.0%	Q=0.390*(P)									4,000	126,000	64,000
	( ) OVE 10 = 1											
	Subtobal (S)								1	6'000	243,000	123,000
TAXTAL OR M COSTS Of = 14 F. O. 40.5 (Note: Total OR M Annual Cost Only lackings I case. Term Activity	FM Annual Cost Only In	dudes I mo-	Fran A	divities						19,000	50,766,000	48,420,000
TOTAL OR M COSTS II = IT TOTAL SI LIVE, INST.	THE CHILDREN SAW SAWS	The second		-								
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (U = H+T)	= H+T)										52,200,000	19,700,000
PH-09.WQ1												0/-Jal-93

PH-09.WQ1 STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 9A: Steam Cleaning Dismantling Salvage, On-Post Nonhazardous Waste Landfill

		Cost	Start	End	1992 (\$)		Volume Mileage	Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item	:	Type	Type Year Year	rar	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS											900	000 (11
Steam Ceaning		ន	_	;	0.29 /SF	367,433 SF	1.000	3	1.000		25,000	000771
Shredding Structure Debrie		2	_	;	0.31 /CY	78,394 CV	1.000	000	1.000		28,000	28,000
Control of the Contro		2	_	;	4.32 /CY	72.588 CY	1.000	1.000	1.000		358,000	358,000
On-post Nonhazardous Waste Landfill Closure	ų	2	· m	;	3.70 /CY	72,588 CY	1.000	1.000	1.000		306,000	278,000
	Subtotal (A)	_								ł	814,000	785,000
	1	1										
AL COSTS		NO.									32,000	30,000
											330,000	318,000
& Proff	39.0% C=0.390 (A+b)										53,000	51,000
											18,000	17,000
gineering	1.5% E = 0.015 - (A+6+C)	G									342,000	330,000
Contingency		7										
	Subtotal (G =B+C+D+E+F)	Ė								ļ	774,000	747,000
	•											
TOTAL CAPITAL COSTS (H = A+G)								١			1,588,000	1,532,000
												07-Jul-93
PII:09A.WO!												

PH-09A.WOI STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 9A: Steam Cleaning. Dismantling. Salvage. On-Post Nonhazardous Waste Landfill

		Cost	Start	End	1002 (\$)		Exp/Red Mileage	Aileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			•	Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT O&M COSTS (OPERATIONS)												•
Dust & Safety Samp of Manuf Structures		<		7	3.75 /CY		1.000	90.1	1.000		2,703,000	2,639,000
Repair of Manufacturing Structures		⋖		7			1.000	000.	1.000		3,136,000	3,061,000
Stram Cleaning		∢	_	7	1.84 /SF	367,433 SF	1.000	0001	1.000		772,000	753,000
Demolition		4	-		11.02 /CY	631,646 CY	1.000	1.000	1.000		7,943,000	7,571,000
Loading Nonhazardous Debris		4	_	•			1.600	1.000	1.000 Expansion		183,000	175,000
Transportation of Nonbazardous Waste On-post		4	-	•	0.86 /CY	78,394 CY	1.600	4.000	1.000 Expansion, Miles		492,000	469,000
Shredding Structure Debris		<	-			78,394 CY	1.600	000	1.000 Expansion		1,907,000	1,817,000
Debris Sampling, Process, Northaz Disposal		<	-	•		72,588 CY	1.300	000.1	1.000 Expansion		10,094,000	9,621,000
Lostino Nonhazardone Debrie		4	_	•		72.588 CY	1.300	000.1	1.000 Expansion		138,000	131,000
Transportation of Nonhazardous Waste On-post		<	-	•	0.86 /CY		1.300	4.000			370,000	353,000
On the Manual Manual Design		: •	-				0001	1.000			337,000	321,000
CALLEGE CONTRACTOR TO SECURIOR		: <					001	00	0001		300,000	286,000
Dacking of Structure Excavation		٠.					000	8	1000		1000	3,000
Restoration of Structure Excavation		∢	-	<del>-</del> 0			90.1	30.1	1.000		20015	200%
	Subtotal (I)	_								1	28,379,000	27,201,000
DIRECT OR M REVENUES (OPERATIONS)		4	_	-	NOT) (19 (3)	NOT 701.81	0001	000	0001		(2,306,000)	(2,198,000)
יאורמקר טו שונים!		:	•	,								
	Subtotal (l')	_								ł	(2,306,000)	(2,198,000)
INDIRECT O&M COSTS (OPERATIONS)	COST CODE	MMLMST	_									
Mob/Demob 2.0%	J = 0.020 * (I)										268,000	244,000
erhead & Profit 37.8%	K = 0.378 * (I+J)										10,927,000	10,474,000
960:0	L = 0.000 * (I+J+K)										000 101	0 00
jineering 2.0%	$M = 0.020 \cdot (1+J+K)$										000'66'	000,500
Contingency 30.0% N	N = 0.300 * (I+J+K+L+M)	_									14.201,000	11,693,000
											24 404 000	32 677 000
	Subtotal (O = J+K+L+M+N)	Ę								[	74,494,000	75,477,000
DIRECT O&M COSTS (LONG-TERM ACTIVITIES)						;				80	000 000	2000
On-post Nonhazardous Waste Landfill Closure		<	~	õ	0.13 /CY	72,588 CY	1.000	3	1.000	000,11	304,000	000,861
	Subtotal (P)	_								11,000	302,000	153,000
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES)	COSTCODE	LLSL								į	,	;
Indirects, Overhead & Profit 39.0% (	Q = 0.390 * (P)									1,000	118,000	60,000
30.0%	R = 0.300 * (P+Q)									000'1	126,000	64,000
	Subtobal (S)	_							I	6,000	243,000	123,000
										000		000 131 00
TOTAL OR M COSTS (T = 1+1'+0+P+S) [Note: Total ORM Annual Cost Only Includes Lone-Tenn Activities]	O& M Annual Cost Only Is	cludes Len	P-Term	Activities						19,000	21.111.000	48.727,000
TOTAL CAPITAL COSTS AND TOTAL O&M COSTS (U = H+T)	U=H+T)										52,700,000	50,300,000
PH-09A.W01												07-Jul-93

PH-09A.WQ1 STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 10: Sand Blasting. Dismantling. Salvage. On-Post Nonhazardous Waste Landfill

		Cost Shart		End	1992(\$)		Volume Mileage	i	Other Foods Description	1995 (\$)	1995 (\$) Total Cost	1995 (\$) PW Cod
Cost Item		Lype Year		Lear	Unit Cost Units	CUBILLIA CHILIS	acto		acion incentional			
DIRECT CAPITAL COSTS												
Sand Blasting		ผ	_	:		503,652 SF	1.000	1.000	1.000		218,000	218,000
Shredding Structure Debris		23	_	:		78,394 CY	1.000	00.	1.000		28,000	28,000
On-nost Nonhazardous Waste Landfill		21	_	;		72,588 CY	1.000	1.000	0001		358,000	358,000
On-post Nonhazardous Waste Landfill Closure	2	LS	•	:	3.70 /CY	72,588 CY	1.000	1.000	1.000		306,000	278,000
	Subrotal (A)	ર								!	000'016	882,000
INDIRECT CAPITAL COSTS	COST CODE	LMSS									35,000	34,000
bond & Ords											369,000	357,000
	4 ER D. O. O. C. C. C. C. C. C. C. C. C. C. C. C. C.										29,000	57,000
											20,000	19.000
jineering	1.5% E = 0.015 * (A+84C)	Ç									383.000	371,000
Contingency	27.5% F=0.275 (A+B+C+U-	Į.										:
	Subtotal (G =B+C+D+E+F)	(H+)									866,000	839,000
TOTAL CAPITAL COSTS (H = A+G)											1,777,000	1,721,000
PILLOWOI												07-Jul-93

PH-10.WOI STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 10: Sand Blasting. Dismantling. Salvage. On-Post Nonhazardous Waste Landfill

1   2   135 CY   1016 CY   1000   1000   1000   1371000   273130			200	Start	End	1992 (\$)		Exp/Red Mileage	Mileage	Other		1995 (\$)	1995 (\$)	1995 (\$)
133 CY 611,646 CY 1200 1200 1200 1200 1231000 12310000 12310000 12310000 12310000 12310000 12310000 12310000 12310000 12310000 12310000 123	Cost Irem		Type	-	rear	Unit Cost Units	Quantity Units	Factor	Factor	Factor Desc	ription	Annual Cost	Total Cost	PW Cost
1.15 CT	DIRECT OR M COSTS (OPERATIONS)												000 600 6	0000000
1.25 SF 100 100 100 Equation Miss 154100 1100 1100 1100 1100 1100 1100 11	Dust & Safety Samp of Manuf Structures		< ∙		7			8 8	8	86.			3.136.000	3,061,000
1.22 CV	Repair of Manufacturing Structures		∢ ⋅		7 -			90.1	200	8			1.581.000	1,543,000
1.13 CV 78, 12, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 Expansion Miles 1,197, 100 100 100 Expansion Miles 1,197, 100 100 100 Expansion Miles 1,197, 100 100 100 Expansion Miles 1,197, 100 100 100 100 100 100 100 100 100 10	Sand Blasting		۷ ۰		7 ,			0001	8	8			7,943,000	7,571,000
1.35 CV 77,579 CV 1670 1000 Expension Miles 1670700 111 1.35 CV 77,258 CV 1,300 1000 Expension Miles 1670700 111 1.35 CV 72,258 CV 1,300 1000 Expension Miles 1670700 111 1.36 CV 72,258 CV 1,300 1000 Expension Miles 173000 111 1.37 CV 72,258 CV 1,300 1000 Expension Miles 173000 111 1.38 CV 72,258 CV 1,300 1000 Expension Miles 173000 111 1.37 CV 72,258 CV 1,300 1000 Expension Miles 173000 111 1.37 CV 72,258 CV 1,300 1,000 1,000 Expension Miles 173000 111 1.37 CV 72,258 CV 1,300 1,000 1,000 Expension Miles 173000 111 1.37 CV 72,258 CV 1,300 1,000 1,	Demolition		∢ ′	-	•			200.					183,000	175,000
13.2 CV 7. 72.58 CV 1.00 1.00 Expansion 11,000 91,000 00 10,000 00	Loading Nonbazardous Debris		∢ •		··· ·			0091	900		msion. Miles		492,000	469,000
13.25 CV   12.58 CV   13.00   1000   Expansion Miles   10.004.000   19.00	Transportation of Nonbazardous Waste On-post		< •		٠.			009	0		nucion		1,907,000	1.817.000
1.34 CV 7.248 CV 1.300 1.000 Equation, MHz 317,000 31000 0.008 CV 7.248 CV 1.300 1.000 1.000 0.000 310000 0.	Shredding Structure Debris		۲ ۰		•			908 1	0		noion		10.094.000	9,621.000
135 A.Y 7, 2,58 C.Y 1,500 1,000 Expansion Mits 37,000 900,000 1,00	Debris Sampling, Process, Norbaz Disposal		۷ -	_	<b>~</b> .			8 2					138,000	131.000
1407 CV 72.585 CV 1,000 1,000 1,000 300,000 300,000 8,000 1,	Loading Nonhazardous Debris		∢ •	<u></u> .	⊷.			86.1	88		msion Miles		370.000	353,000
10.08 SF 32,687 CY 1,000 1,000 1,000 300,000 300,000 0,008 SF 32,687 CY 1,000 1,000 1,000 1,000 1,000 30,000 27, 22,088,000 1,	Transportation of Nonhazardous Waste On-post		<	_	•		17 200 //	905:	3		manual transport		337.000	321 000
8.65 FF 32.64 CY 1,000 1,000 200 27,	On-post Nonhazardous Waste Landfill		∢	-	~			000.	90.	80.			300,000	286,000
1,000   1,00	Backfill of Structure Excavation		<	_	m			000.1	8 8	000.			1000	1000
(52.61) / TON   38,407 TON   1,000 1,000 1,000   (2,306,000)   (2,206,	Restoration of Structure Excavation		<	-	•			1.000	3	20.				
(52,61) /TON 38,407 TON 1,000 1,000 1,000 (2,306,000) (2,206,000)		Subtotal	_									•	29,188,000	27,991,000
(52,61) / TON 38,407 TON 1,000 1,000 1,000 (2,396,000)														
(324) 710N 38,407 10N 1,000 1,	DIRECT OR M REVENUES (OPERATIONS)						100	8	8	8			(0.000)	(000 801 6)
1,296,000   10,000   1,000	Salvage of Metal		∢	_	3	(52.61) /TON	38,407 TON	1,000	1.000	000.1			(mature 7)	(5,17,000)
\$84,000   10, 00   1,0		Subtotal (I	_									ļ	(2,306,000)	(2,198,000)
384,000 11,239,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 11,00														
11,239,000 10, 820,000 12, 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 12,549,000 59,000 12,549,000 59,000 12,549,000 59,000 12,549,000,000 59,	INDIRECT ORM COSTS (OPERATIONS)	COSTCODE	MMLMS	<b>.</b>									300103	900 000
11,2540,000 12,000 12,000 11,000 1,000 11,000 302,000 34,000 126,000 34,000 24,000 126,000 34,000 24,000 24,000 24,000 24,000 24,000 24,000 34,000 34,000 34,000 34,000 34,000 34,000 34,000 34,000,00		J = 0.020 * (I)											330,000	10 779 000
820,000 12,549,000 12,		K = 0.378 * (I+J)											00,862,11	200
11,549,000 1,258 CY 1,000 1,000 1,000 11,000 302,000 34,000 1,000		L = 0.000 * (I+J+K)											00000	787 000
25,192,000 23,  213,020 23,  11,000 302,000  4,000 118,000  4,000 126,000  5,000 243,000  5,4,000,000 51		$M = 0.020 \cdot (1+J+K)$											12 549 000	12 035 000
25,192,000 24,  0.13 /CY 72.588 CY 1.000 1.000 11,000 302,000  11,000 302,000  4,000 118,000  4,000 126,000  9,000 243,000  54,400,000 51		N = 0.300 * (I+J+K+L+N	_										2001.671	0001001
0.13 /CY 72.58 CY 1.000 1.000 111,000 302,000 118,000 4,000 118,000 126,000 12		M. L. M. I. M. I. M.	5									į	25,192,000	24,159,000
0.13 /CV 72.588 CV 1.000 1.000 11,000 302,000 11,000 302,000 110,000 302,000 118,000 1	CHIMITIES A COSTS A ONG TERM ACTUALIES	SUCCOUNT (U = U+N+L+IN	•											
11,000 302,000 4,000 118,000 4,000 126,000 19,000 52,612,000 50 54,100,000 51	DIRECTOR NO. 120 CONTROLLEN ACTIVITIES		4		ç	0.13 /CY	72.588 CY	1.000		1.000		11,000	302,000	153,000
11,000 302,000 4,000 118,000 4,000 126,000 19,000 52,619,000 80 54,100,000 51	Chi-prist international waste Labouri Crissina		:	1	:									
11,000 302,000 4,000 118,000 4,000 126,000 19,000 213,000 19,000 52,619,000 50														
4,000 118,000 4,000 126,000 9,000 23,13,000 19,000 50 19,000 50 19,000 50													000 000	000 531
4,000 118,000 4,000 126,000 9,000 213,000 19,000 52,619,000 50 54,000,000 51		Subtotal ()									l	11,000	302,000	000,000
4,000 126,000 9,000 243,000 19,000 52,612,000 54,100,000 51	INDIRECT ORM COSTS (LONG-TERM ACTIVITIES)	COSTCODE	LLSL									1,000	118,000	60,000
9,000 243,000 80 19,000 52,619,000 80 54,400,000 51		G = 0.300 * (P-)										4,000	126,000	64,000
12,000 52,619,000 54,400,000		» [	ā									000'6	243,000	123,000
19.000 52.619.000 54.400,000		) Importance	÷								ł			
24,400,000	TOTAL ORM COSTS (T = 1+1'+0+P+S) INOIC: TOTAL	1 O&M Annual Cost Only	ncludes Lon	.Tem	Activities							19,000	52 619.000	50.228.000
	TOTAL CARTAL CASTS AND TOTAL OF M COSTS	T4H-11)											54,400,000	51,900,000
ES DAA	TOTAL CAPITAL COSTS AIND TOTAL COSTS	7												
STRUCTURES DAA	PH-10WO1													07-Jul-93
	STRUCTURES DAA													

Table C.9 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 12: Dismantling, Salvage, Off-Post Rotary Kiln Incineration, Off-Post Hazardous Waste Landfill

			Cost	Start	End	1992 (\$) Hais Cost Units	Ouantity Units	Volume	Mileage	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS Shredding Structure Debris Transfer Station				1	: :	0.31 .CY 0.24 /CY	78,394 CV 72,388 CV	1.000	000.1	1.000		28,000	28,000
		Subtodal (A)	•									48,000	48,000
INDIRECT CAPITAL COSTS 4 MobDerrob 4 Indirects, Overhead & Proft 37 Engineering Design 4 Resident Engineering 11	4.5% 37.8% 4.5% 1.8% 28.8%	COST CODE B = 0.045 * (A) C = 0.378 * (A+B) D = 0.045 * (A+B+C) E = 0.018 * (A+B+C) F = 0.288 * (A+B+C+D+E)	MMLS E)									2,000 19,000 3,000 1,000 21,000	2,000 19,000 3,000 1,000 21,000
		Subtotal (G =B+C+D+E+F)	Ē								1	46,000	16,000
DIRECT SUBCONTRACT CAPITAL COSTS												o	٥
												•	•
		Subtotal (A1)									•	7	1
INDIRECT SUBCONTRACT CAPITAL COSTS  MobDemob Contractor Markup Grapineering Design Resident Engineering Contringency	%000 %000 %000 %000 %000	COSTCODE: 0 B1 = 0.000*(A1) C1 = 0.000*(A1+B1) D1 = 0.000*(A1+B1+C1) E1 = 0.000*(A1+B1+C1) F1 = 0.000*(A1+B1+C1)	0 0 1) 1+D1+E1)									00000	00000
		Subtotal (G1 = B1+C1+D1+E1+F1)	)1+E1+F1)								ı	0	0
TOTAL CAPITAL COSTS (H = A+G)									į			93,000	93,000
PIH-12WOI STRUCTURES DAA													07-Jul-93

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 12: Dismantling, Salvage, Off-Post Rotary Kiln Incineration, Off-Post Hazardous Waste Landfill

		1	Start	End	1992 (\$)			Exp/Red	Mileage	Other Foder Periodical	1995 (\$)	1995 (\$) Total Cort	(\$) \$661 PW (Cort
DIDECT OF M COSTS (OPERATIONS)		- ADG	1	L CSL	Cuit Cost Onus	5	Cusumity Cuits	T T T	aria.	in action in the second	SON BRIDE		
Dust & Safety Samp of Many Structures		<	<b>-</b>	7	3.75 /CY	89	631,646 CY	1.000	1.000	1.000		2,703,000	2,639,000
Repair of Manufacturing Structures		<	-	2	4.35 /CY		631,646 CY	1.000	1.000	1.000		3,136,000	3,061,000
Demolition		<	_	2	11.02 /CY	89	631,646 CY	1.000	1.000	1.000		7,943,000	7,754,000
Loading Hazardous Debris		4	-	2	1.55 /CY	7	78.394 CY	1.600	1.000			222,000	217,000
Transportation of Hazardous Waste On-post		<		7	1.07 /CY	7	78,394 CY	1.600	1.000			613,000	598,000
Shredding Structure Debris		<		2	13.32 /CY	•	8394 CY	1.600	2000			1,907,000	1,861.000
Debris Sampling, Process/Agent, Haz Disposal		4	-	7	213.05 °CY	7	72,588 CY	1.300	000.			22,942,000	22,396,000
Loading Hazardous Debris		<	_	7	1.55 /CY			DOF.1	1.000			000'/91	103,000
Transfer Station		<	-	7	0.41 /CY		72,588 CY	1.300	000.	1.000 Expansion		44,000	45,000
Backfill of Structure Excavation		< ⋅	<b></b> .	7	8.05 /CY	~ •	32687 CY	000.	000:	000.		3,000	3,000
Restoration of Structure Excavation		<	_	7	U.OR /SF	~	708/ CI	000.1	1.000	1.000		2,000	non's
	Subtotal (I)										1	39,980,000	39,028,000
INDIFFECT ORM COSTS (OPERATIONS) 20%	COSTCODE J≈0020*()	MMLSST	<b>-</b>									800,000	781,000
& Profit	K = 0.378 * (I+J)											15,394,000	15,028,000
	L = 0.000 * (I+J+K)											083 000	0
Resident Engineering 1.8% Contingency 28.8%	M = 0.018 * (I+J+K) N = 0.288 * (I+J+K+L+M)											16,150,000	15,765,000
	Subtotal (O = J+K+L+M+N)	5									1	33,327,000	32,533,000
DIRECT SUBCONTRACT 08M COSTS (OPERATIONS)	(S)												
Off-post Rotary Kiln Incineration		<	_	7	4,110.00	Ĺ	72.588 CV	1.000	1.000	1.000		340,452,000	332,346,000
	Subtotal (i')										l	340,452,000	332,346,000
INDIRECT SUBCONTR. O&M COSTS (OPERATIONS)		∢										1	•
	J' = 0.000 * (I)											0	0 000
Contractor Markup 6.0%	K = 0.080 * (l'+J)											20,427,000	19.941,000
Engineering Design 0.0% Recident Engineering 0.1%	N' = 0.000 (143+K)											361,000	352,000
,,	N' = 0.300 * (I'+J'+K'+L'+M')	5										108,372,000	105,792.000
	Subtotal (O' = J'+K'+L'+M'+N')	Ę.									ļ	129,160,000	126,085,000
	-												
DIRECT ORM REVENUES (OPERATIONS) Salvage of Metal		∢	-	7	(52.61) /TON	E .	38,407 TON	1.000	1.000	1.000		(2,306,000)	(2,251,000)
	Subtotal (V)										1	(2,306,000)	(2,251,000)
TO TAL ORM COSTS (OPERATIONS) ( $P = 14^{\circ} + 0 + 0^{\circ} + V$ )	<b>V</b>											540,612,000	527,741,000
, C. 11.													30-Drc-1899
PH-12.WQI													30-00-10

PH-12.WQ1 STRUCTURES DAA

Table C.9 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 12: Dismantling Salvage, Off-Post Rotary Kiln Incineration, Off-Post Hazardous Waste Landfill

		•									
		Cost	Cost Start End	1992 (S) Unit Cost Units	Ougntity Units	Exp/Red 1	Exp/Red Mileage Other Factor Factor Factor	Mileage Other Factor Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
LOST HEM ACTIVITIES) INDIRECT ORM COSTS (LONG-TERM ACTIVITIES)									0	0	0
	Sufform								0	0	0
INDIRECT ORM COSTS (LONG-TERM ACTIVITES) Indirects, Overhead & Proft Contrigency 0.0%		0							00	00	00
	Subtotal (1)	_							0	0	0
TOTAL OR M COSTS (LONG-TERM ACTIVITIES) (U = 0+1).	U=0+D								0	0	0
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H4P4U)	S (U = H+P+U)						į			341,000,000	528,000,000

07-Jul-93

PH-12:WOI STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 13: Dismantling Salvage, On-Post Rotary Kiln Incineration. On-Post Hazardous Waste Landfill

Cast Barn			Cost	Start	End	1992 (\$) Unit Cost Units	its	Quantity Units	Units	Volume Factor	Mileage Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS			ı	1										1	
Shredding Structure Debris			ន	_	;	0.31	Ç	78,394	ઇ	1.000	000:	1.000		28,000	28,000
On-rost Hazardens Waste Landill			ន	_	:	5.72	Ç	72,588	Ç	0.700	1.000	1.000 Reduction		332,000	332,000
On-post Hazardous Waste Landfill Closure	210		รา	2	:	3.80	Ç	72,588	Ç	0.700	1.000	1.000 Reduction		220,000	210,000
		Subtotal (A)											1	280,000	269,000
INDIRECT CAPITAL COSTS	ě	COSTCODE	CLMS											19,000	19,000
MonUembo Indirects, Overhead & Profit	37.8%													226,000	222,000
Engineering Design Resident Engineering	3.0% 1.3%	U = 0.030 * (A+B+C) E = 0.013 * (A+B+C)												11,000	10,000
Contingency	26.3%	F = 0.263 * (A+B+C+D+E	<u> </u>											000,622	200,717
		Subtotal (G =B+C+D+E+F)	۴										1	\$03,000	494,000
DIRECT SUBCONTRACT CAPITAL COSTS On-post Rotary Kiln Incineration	4.5		য	-	:	36.37	Ş	72,588	ţ	1.000	1.000	1.000		3,013,000	3,013,000
		Subtotal (A1)											i	3,013,000	3,013,000
INDIRECT SUBCONTRACT CAPITAL COSTS	চ		υ				-							8	9000
MobDemob	20%													307,000	307,000
Contractor Markup	90.0	C1 = 0.100 = (A1+B1)												304,000	304,000
Engineering Design	5 6													101,000	101,000
Confingency	30.0%	F1 = 0.300 * (A1+B1+C1+D1+E1)	D1+E1)											1,136,000	1,136,000
		Subtotal (G1 = B1+C1+D1+E1+F1)	1+E1+F1)	_									I	1,909,000	1.909.000
TOTAL CAPITAL COSTS (H = A+G)							:							6,005,000	5,985,000
PH-13WOI															07-Jul-93

PH-13.WQ1 STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 13: Dismantling Salvage, On-Post Rotary Kiln Incineration. On-Post Hazardous Waste Landfill

Cost least		Cost St	Start End Year Year		1992 (\$) Unit Cost Units		Ouantity Units		Exp/Red A	Mileage Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT OR M COSTS (OPERATIONS)		1			7.00				000	9	000		2 703 000	2.639.000
Dust & Safety Samp of Manuf Structures		∢ .		7	3.75 ACY		931,946 CY		900	8	0001		3 136 000	3.061.000
Repair of Manufacturing Structures		۷ ۰		7 ,	4.33 /CT		631.646 CT		8	8 6	0001		7.943.000	7,754,000
Demolition		< <		7 ٢	1.02 /C1				1,600	000	1.000 Expension		222,000	217,000
Loading Hazardous Lycoris		: <		. ~	1 07 /CV				1.600	4.000			000'819	598,000
Cheedding Structure Debric		٠ <		. 7	13.32 /CY				1.600	1.000			1,907,000	1,861,000
Debris Sampling, Process/Agent, Haz Disposal		⋖	_	2	213.05 /CY				1.300	1.000			22,942,000	22,396,000
Loading Hazardous Debris		<	_	7	1.55 /CY				1.300	1.000			167,000	163,000
Transportation of Hazardous Waste On-post		<	_	2	1.07 /CY				1.300	4.000	1.000 Expansion, Miles		161,000	420,000
Loading Hazardous Debris		<	_	7	1.55 /CY				1.300	1.000			167,000	163,000
Transportation of Hazardous Waste On-post		∢	_	<b>C</b> 4					0.700	4.000			248,000	242,000
On-post Nonbazardous Waste Landfill		4	_	7	1.07 /CY				0.700	000	1.000 Reduction		236,000	230,000
Backfill of Structure Excavation		<	_	7					88	000	0001		000,000	000,62
Restoration of Structure Excavation		٧	-	۲1	0.08 /SF		32,687 CV		000.1	000.	1.000		3,000	3,000
	Subtotal (f)												41,048,000	40,070,000
INDIRECT O&M COSTS (OPERATIONS)	COSTCODE	MMLSST												;
MobDemoh	0 + 0200 = 1												821,000	801,000
erhead & Profit	K = 0.378 * (I+J)												15,805,000	15,429,000
	L = 0.000 * (1+.3+K)												0	0
5	M=0018*(45)+K)												1,009,000	985,000
	N = 0.288 * (I+J+K+L+M)												16,581,000	16,186,000
													31 217 000	33 402 000
	Subtotal (O = J+K+L+M+N)	-											200, 12,50	200
DIRECT SUBCONTRACT O&M COSTS (OPERATIONS)	(Ş												200	000 010
On-post Retary Kiln Incineration		<	-	۲.	<del>1</del> .36	Ç	72.588	5	99.1	000.1	1.000		000,906,11	000,570,11
	Subtotal (1)											j	11,958,000	11,673,000
	•													
INDIRECT SUBCONTR. O&M COSTS (OPERATIONS)	3) 00STCODE:	٥											•	•
	J' = 0.000 * (f)												0	0 4457
-	K=0.100*(I'√J)												000000	0
	L'=0.000*(f'+J'+K)												263000	257,000
Resident Engineering 2.0% Continuency 40.0%	M = 0.020 - (1 + 0.4K) N = 0.400 - (1 + 0.4K + (1 + M))	5											5,367,000	5,239,000
	Subtotal (O' = J'+K+L'+M'+N')	ĹŽ.										]	6,826,000	6,663,000
DIRECT OR M REVENUES (OPERATIONS) Salvam of Metal		<	_	¢.	(52.61)	TON	38,407	NOT	1.000	1.000	1.000		(2,305,813)	(2,250,913)
Salvage Of William		:		,										
	Subtotal (V)												(2,306,000)	(2,251,000)
MAYON OF MANAGERS (NORTH AT ALL ) AND AT AT AT AT AT AT AT AT AT AT AT AT AT	<b>S</b>												91,742,000	89,558,000
CONTRACTOR CONTRACTOR														
PH-13.WOI														30-Dec-1899

PH-13.WOI STRUCTURES DAA

Table C-10 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup
Alternative No. 13: Dismantling Salvage, On-Post Rotary Kiln Incineration, On-Post Hazardous Waste Landfill

Contlian		Cost Start End		End	1992 (\$) Unit Cost Units	Ouantity Units	Fxp/Red Factor	Exp/Red Mileage Other Factor Factor Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES) On-post Nonbazardous Waste Landfill Closure		<b>*</b>	7	æ	0.13 /CY	72,588 CY	1.000	1.000	000.1	11,000	312,000	163,000
	Subtotal (Q)								,	11,000	312,000	163,000
INDRECT ORM COSTS (LONG-TERM ACTIVITIES) Indirects. Overhead & Proft 39.0%. Contingency 30.0%	COST CODE R = 0.390 * (Q) S = 0.300 * (Q+R)	LLSL								4,000	122,000 130,000	64,000 68,000
	Subtotal (T)	_							•	8,000	252,000	132,000
TOTAL O&M COSTS (LONG-TERM ACTIVITIES) (U = 0+1)	(V = 0+D									19,000	264,000	295.000
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+P+U)	IS (U = H+P+U)										98.300,000	95,800,000
PIF13.WQI STRUCTURES DAA												07-Jul-93

Table C-11 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 19: Dismantling Salvage, On-Post Hazardous Waste Landfill

Coot Item	Year 7	Unit Cost Units 0.31 /CY 5.72 /CY 3.80 /CY	Ouantity Units 78,394 CY 72,588 CY 72,588 CY	Factor 1.000	Factor F. 1.000 1 1.000 1 1.000 1	Factor Description 1,000 1,000	Annual Cost	Total Cost 28,000 474,000 315,000	PW Cost 28,000 474,000 300,000
APITAL COSTS ding Structure Debris sst Hazardous Waste Landfill sst Hazardous Waste Landfill Closure	2 - 1 - 1	0.31 /CY 5.72 /CY 3.80 /CY	78.394 CY 72.588 CY 72.588 CY	00001		0001 0001		28,000 474,000 315,000	28,000 474,000 300,000
Closure Sutholal (A)		0.31 (CY 5.72 (CY 3.80 (CY	7,258 CY 7,258 CY 7,258 CY 7,588 CY 7,5	00001		880 800 800 801		28,000 474,000 315,000	28,000 474,000 300,000
Closure Sulmoial (A)	- 2	5.72 CY 3.80 /CY	72.588 CY	1.000		000 000		474,000	474,000 300,000
Closure Sulmoial (A)	:	3.80 /CY	72,588 CY	1.000		0001		315,000	300,000
Sultotal (A)									
Sultrotal (A)									
Sultrotal (A)									
Sufficial (A)									
Suthotal (A)									
Sultidal (A)									
								816,000	801,000
INDIRECT CAPITAL COSTS COST CODE LLMS									
Moh/Demob 3.3% B = 0.033*(A)								27,000	26,000
shead & Proff 37 PS.								318,000	312,000
								35,000	34,000
386								15,000	14,000
86.98								318,000	312,000
Subtotal (G =B+C+D+E+F)							•	712,000	000,669
TOTAL CAPITAL COSTS (H = A+G)								1,528,000	1,500,000

07-Jul-93

PH-19,WOI STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 19: Dismantling, Salvage, On-Post Hazardous Waste Landfill

		Cost	Start	End	1992 (\$)		Exp/Red Mileage	ileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item		Type	Year	Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT OR M COSTS (OPERATIONS)												
Dust & Safety Samp of Manuf Structures		∢	-	2	3.75 /CY		1.000	000	1.000		2,703,000	2,639,000
Repair of Manufacturing Structures		∢	-	7			1.000	000	1.000		3,136,000	3,061,000
Demolition		∢	-	2			1.000	000	1.000		7,943,000	7,754,000
Loading Hazardous Debris		∢	_	7			1.600	1.000			222,000	217.000
Transportation of Hazardous Waste On-post		⋖	-	2	1.07 /CY		1.600	4.000			613,000	298,000
Shredding Structure Debris		4	_	7			1.600	000.	1.000 Expansion		1,907,000	1,861,000
Debris Sampling, Process/Agent, Haz Disposal		¥	_	2			1.300	1.000			22,942,000	22,396,000
Loading Hazardous Debris		∢	-	7			1.300	000.1			167,000	163,000
Transportation of Hazardous Waste On-post		∢	-	7			1.300	4.000	1.000 Expansion, Miles		461,000	450,000
On-post Hazardous Weste Landfill		∢	_	2			1.000	000.	1.000		337,000	329,000
Backfill of Structure Excavation		∢	-	2			1.000	000.	1.000		300,000	293,000
Restoration of Structure Excavation		4	_	7	0.08 /SF	32.687 CY	1.000	1.000	1.000		3,000	3,000
	C) Learning										40.734,000	39,764,000
	i) ipologe	_								1		
DIRECTORM REVENUES (OPERATIONS)												
Salvage of Metal		∢	-	7	(52.61) /TON	38.407 TON	1.000	0001	1.000		(2,306,000)	(2,251,000)
											(7 306 000)	(000) 157 (7)
	Sucrotal (T.)	_								ţ	(A)	
INDIRECT ORM COSTS (OPERATIONS)	COSTCODE	MM SST										
Mobile moh	J = 0.020 * ()										815,000	795,000
erhead & Profit	K = 0.378 * (I+J)										15,684,000	15,311,000
	L = 0.000 * (I+J+K)										0	0
50	M = 0.018 * (I+J+K)										1.002.000	0008/6
Contingency 28.8%	N = 0.288 * (I+J+K+L+M)										16,742,000	16,344,000
	0.34. 1.7.1 - O latesta	5									34,243,000	33,428,000
PRINCE OF M COSTS (1 ONG TERM ACTIVITIES)	SUCCESS (C) = 3+K+L+M4	Ē								l		
On-post Hazardous Waste Landfill Closure		<	7	30	0.13 /CV	72.588 CV	1.000	1.000	1.000	11,000	312,000	163,000
		_								11 000	317 000	000191
NATIONAL DEM COSTS & ONG. TERM ACTIVITIES	Subtotal (P)	1511							•	ANATH I	A.XXX.	
Indirects: Overhead & Profit 39.0%	Q = 0.390* (P)									4,000	122,000	64,000
	R = 0.300 * (P+C)									4,000	130,000	68,000
	Subtotal (S)								•	6,000	252,000	132000
TOTAL O&M COSTS (T = 1+1'+0+P+S)   Note: Total O&M Annual Cost Only Includes Long-Term Activities]	ol O&M Annual Cost Only Ir	cludes Long	Tem,	Activities						19,000	73,235,000	71,235,000
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+T)	S (U = H+T)				٠						74,800,000	72,700,000
PH-19.WO1												07-Jul-93
STRUCTURES DAA												

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 20: Dismantling Salvage, Off-Post Hazardous Waste Landfill

Cost Hem			Cost	Start Year	End Year	1992 (\$) Unit Cost Units	Ouantity Units	Units	Volume Factor	Milrage Factor	Other Factor Description	A	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS Shredding Structure Debris Transfer Station			<sub>2</sub> 2	i .	1 1	0.31 /CY 0.24 /CY	78,394 CY 72,588 CY	, c,	000:1	1.000	1.000			28,000 20,000	28,000
		Subtotal (A)												48,000	48,000
IND/RECT CAPITAL COSTS Mot/Demob Indirects. Overhead & Proft Ergineering Design Resident Ergineering Contingency	3.3% 3.0% 1.3% 26.3%	COST CODE B = 0.033 * (A) C = 0.390 * (A+B) D = 0.030 * (A+B+C) E = 0.013 * (A+B+C) F = 0.263 * (A+B+C+D+E)	rrss											2,000 19,000 2,000 1,000 18,000	2,000 19,000 2,000 1,000
DIRECT SUBCONTRACT CAPITAL COSTS		Subtotal (G =8+C+D+E+F)											•	42,000	42,000
0			0	0	1	0.00 0.00	0	0	1.000	000:	<b>00</b>			o	0
		Subtotal (A1)						,					İ	0	٥
INDHECT SUBCONTRACT CAPITAL COSTS MobDemob Contractor Mathe Contractor Design Engineering Design Resident Engineering Contingency	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	005T000E: 0 B1 = 0.000 (A1) C1 = 0.000 (A1+B1) D1 = 0.000 (A1+B1+C1) E1 = 0.000 (A1+B1+C1) F1 = 0.000 (A1+B1+C1+D1+E1)	0 -D1+E1)											00000	00000
		Subtotal (G1 = B1+C1+D1+E1+F1)	1+E1+F1)											0	0
TOTAL CAPITAL COSTS (H = A+G).														000'06	000'06

07-Jul-93

PH-20.WQI STRUCTURES DAA

Cost Estimate - No Future Use. Manufacturing History Medium Group - Process History Subgroup Alternative No. 20: Dismantling. Salvage. Off-Post Hazardous Waste Landfill

		Cost		End	1992 (\$)			Exp/Red	2	1		1995 (\$)	(\$) \$661	1995 (\$)
Cost Item		Турс	1	Year	Unit Cost Units		Ounntity Units	Factor	Factor	Factor Description		Annual Cost	lotal Cost	rw Cost
DIRECT OR M COSTS (OPERATIONS)		•	•	,	276		KJ WHY CA	00	1,000	0001			2,703,000	2,639,000
Dust & Safety Samp of Manuf Structures		< ⋅		7 (	3.73 ACT			0001					3,136,000	3,061,000
Repair of Manufacturing Structures		٠ ٠		٧,	11.03 /CT			001	000	0001			7,943,000	7,754,000
Demolition		< <		7 ~	1.55 /CY			1.600	1.00	1.000 Expansion			222,000	217,000
Loading razardous Deuts		: ◄	-	, ,	1 07 /CY		78.394 CY	1.600	4.000	1.000 Expension, Miles	Miles		613,000	298,000
Shredding Structure Debris		<		, 7	13.32 /CY			1.600	1.000				1,907,000	1,861,000
Debris Sampling, Process/Agent, Haz Disposal	-	∢	-	7	213.05 /CY			1.300	000	1.000 Expansion			22,942,000	22,396,000
Loading Hazardous Debris		<	-	7	1.55 /CY			1.300	1.000				000,741	163,000
Transfer Station		∢	-	7	0.41 /CY			1.300	1.000		;		44,000	43,000
Transportation of Hazardous Waste Off-post		<	-	7	0.19 /CY			1.300	70.000	1.000 Expansion, Miles	Miles		1,432,000	703 000
Backfill of Structure Excavation		<	-	7	8.05 /CY			000.	000	0001			3,000	293,000
Restoration of Structure Excavation		∢	-	7	0.08 /SF		32687 CY	1.000	000.1	1.000			3,000	3,000
	Subtotal (f)	9											41,412,000	40,426,000
	3001300	TOOM	Too											
INDIRECTORM COSTS (OPERATIONS)	1.000 to 1.0		700										828,000	809,000
erhead & Profit													15,946,000	15,566,000
	0.0% L = 0.000 * (I+J+K)										-		000	001000
Đ.		:											16.728.000	16,330,000
Contingency 28.	28.8% N = 0.286 * (I+J+K+L+M)	(¥												
	Subtotal (O = J+K+L+M+N)	(N+M+											34,521,000	33,699,000
								,						
DIRECT SUBCONTRACT O&M COSTS (OPERATIONS) Off-post Hazardous Waste Landfill	(SNOUS)	<	-	7	76.00 (CY	<b>-</b>	72.588 CV	٧ 1.000	1.000	000'1			6,295,000	6,146,000
													6,295,000	6,146,000
	Subtotal (f.)													
ONTR. O&M COSTS (OPERV	_	00E: B											0	0
Mob/Demob 0.0	0.0% J = 0.000 = (I)												378,000	369,000
_		_											0 (	00
g,		و د د د											1,668,000	1,629,000
Contingency 25.	N+U+1)-UC2.U≈ N &U.€2	+L +M)											•	
	Subtotal (O' = J'+K'+L'+M'+N)	-L.+M.+N)											2,046,000	1,997,000
DIRECT OR M REVENUES (OPERATIONS) Salvage of Metal		<	-	7	(52.61) 小	TON	38.407 TO	1.000 TON	1.000	1.000			(2,305,813)	(2,250,913)
													000 305 67	(000) 156 67
	Subtotal (V)	3											(2,300,000)	(vov.16.2,2)
TOTAL O&M COSTS (OPERATIONS) (P = I+1'+O+O'+V)	(\tau-0+0												81,968,000	80,017,000
														30-Dec-1899
PIF-20.WQI STRUCTURES DAA														

Table C-12 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 20: Dismantling Salvage, Off-Post Hazardous Waste Landfill

		Cost	Cost Start End	End	1992 (\$) Unit Cost Units	Ousantire Unite	Exp/Red Factor	Mileage	Exp/Red Mileage Other Factor Description	1995 (\$) Annual Cost	1995 (S) Total Cost	1995 (\$) PW Cost
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES)			ē							0	0	٥
									,	0	0	0
INDRECTORM COSTS (LONG-TERM ACTIVITES) Indirects, Overlead & Proft 0.0% Confingency 0.0%		0							·	0	0	00
	Subtotal (1)								•	0	0	0
TOTAL OR M COSTS (LONG-TERMACTIVITIES) (U = 0+T)	U=0+D									0	0	0
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+P+U)	(V = H+P+U)										82,100,000	80.100.000
PH-20,WO1 STRUCTURES DAA									•			07-Jul-93

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 21: Dismanling, Clay Cap

		Cost	Cost Start End	End	1902 (\$) Thir Cost Thire	Onsacite: Inite	Volume Mileage		Other Factor Description	1995 (\$) Annual Cost	1995 (S) Total Cost	1995 (\$)
DIRECT CAPITAL COSTS		<u> </u>	-		O 31 CV	78 39.1 CV		1	1 000		28.000	28.000
Surconing Surceure Deons		3	-	!	120 100							
		Subtotal (A)									28,000	28,000
INDIRECT CAPITAL COSTS MobDemob		COSTCODE LLSS									1,000	1,000
Indirects, Overhead & Profit Frainvering Design		* (A+B)									11,000	000,1
Resident Engineering	1.3% E = 0.013	E = 0.013 * (A+B+C)									0 0011	0 011
Contriberty		Substant (G = 14-C4-C4-E4-E4									25,000	25,000
TOTAL CAPITAL COSTS (H = A+G)											52.000	\$2,000
NPH-21.WQ1 STRUCTURES DAA												08-Jul-93

Table C-13 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 21: Dismantling, Clay Cap

AUCHIANC NO. 21. DAMANING CLAY CAP	umg cray cap												
		Cost	Start	End	1992 (\$)		Exp'Red Mileage		Other		1995 (\$)	1995 (\$)	1995 (\$)
Cost Item				Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	ription	Annual Cost	Total Cost	PW Cost
DIRECT OR M COSTS (OPERATIONS)							;					000 000 1	3 630 000
Dust & Safety Samp of Manuf Structures		∢	-	7	3.75 /CY	631,646 CY	1.000	1.000	00.1			2,705,000	2,059,000
Repair of Manufacturing Structures		¥	-	7		631.646 CY	000.	1.000	000			3,130,000	3,000,000
Demolition		<	-	7	11.02 /CY	631.646 CY	1.000	000				7,943,000	000,75
Losting Nonhagardone Debaie		<	-	7	1.28 /CY	78,394 CY	1.600	1.000		Expansion		183,000	179,000
Transportation of Nonhagerdone Weste (Brand		<	_	7		78.394 CY	1,600	4.000		Expansion, Miles		492,000	481,000
right of the Commercial Commercia		. 4	_	,		78,394 CY	1.600	1.000		Expension		1,907,000	1,861,000
Spreading Squarter Depris		< ∢	· <b>-</b>		4.26 /CY	109,474, CY	1.300	1.000	1.000 Exp	Expension		692,000	675,000
Consoling Manufacturing Consoling		: ◄	-	۰,		109,474 CV	1.300	1.000	1.000 Exp	Expansion		208,000	203,000
Loading Iventingzaroous Lycuits		: •				V2 E7E 901	1.300	4.000	1.000 Exp	Expansion, Miles		229,000	245,000
Transportation of Nonhazardous Waste On-post		∢ .		7 1		01831 CV	80	8				786,000	767,000
Consolidation of Structural Material		<	-	7		10 770'56	900.1	3 8				000 200	107 000
Clay Cap		∢	_	7		1/3,11/ SF	000.1	20.	200			000 31	73,000
Vegetative Cover for Cap		<	-	7	0.38 /SF	173,117 SF	1.000	98.	30.1			2001	poor's
	(I) Subtotal (I)											19,090,000	18,636,000
DIRECT ORM REVENUES (OPERATIONS)									8			(7 30% 000)	(7.751.000)
Salvage of Metal		∢	-	7	(52.61) /TON	NOT 701,88.	1.000	38.1	3	•		(5,300,000)	(421,000)
	Subtotal (I')	_										(2,306,000)	(2,251,000)
NORDEST COM COSTS (NDEBATIONS)	STODE	MAMSST	<del>L</del>										
INDINECTION COSTS (OFFICIALS)	1-000+0		:									382,000	373,000
Modulation Cuertand & Proff 39 (94)	K = 0.390 * (I+1)											7,594,000	7,413,000
	L = 0.000 * (I+J+K)											0	0
5	M=0.018*(I+J+K)											174,000	462,000
•		_										7,918,000	7,729,000
	Subtotal (0 = J+K+L+M+N)	Ę									1	16,367,000	15,977,000
DIRECT OF M COSTS (LONG-TERM ACTIVITIES)													
Claufan		<	2	30	0.09 /SF	173.117 SF	1.000	000	1.000		18,000	516,000	269,000
		<	^	Ş	78 100 00 AFAR	1 YR	1.000	1.000	000.		89,000	2,585,000	1,349,000
(roundwater Montoning		< <	٠, ١	2 5	S JOHN WEAR	1 YR	1.000	1.000	000.1		9,000	179,000	93,000
5-Year Site Review		•		2									
	Subtotal (P)	٤								l	113,000	3,279,000	1,712,000
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES)	COSTCODE	LIST									;		000
Indirects, Overhead & Profit 39.0%											44,000	1,2/9,000	714 000
Contingency 30.0%	R = 0.300 * (P+Q)										47,000	0001/061	2001
	Subtotal (S)									1	91,000	2,646,000	1,382,000
											;		30
TOTAL O&M COSTS (T = 1+1'+0+P+S) INote: Total O&M Annual Cost Only Includes Long-Term Activities	O&M Annual Cost Only In	dudes Long	-Tem A	ctivities							204,000	39,077,000	35,456,000
												39,100,000	35,500,000
TOTAL CAPITAL CUSTS AND TOTAL URM CUSTS (U = H+1)	(O = H+I)												

08-Jul-93

NPH-21.WQ1 STRUCTURES DAA

Table C-14 Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Alternative No. 21A: Dismantling. Consolidation

			Cost Start	urt End	1992(\$)		Volume Mileage		Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			Type Ye		Unit Cost Units	Ougnity Units	Factor	Factor	Factor Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS Shredding Structure Debnis			23		0.31 /CY	78,394 CY	1.000	1.000 1.000	1.000		28,000	28,000
		Subtotal (A)	ર								28,000	28,000
INDIRECT CAPITAL COSTS	į		LLSS								1,000	1,000
Mob/Demob Indirects, Overhead & Profit	39.0%	G = 0.390 * (A+B)			,						11,000	0001
Engineering Design Recident Engineering	30.0%										0	0
Contingency	26.3%	F = 0.263 * (A+B+C+D+E)	Ō.								11,000	11,000
		Subtotal (G =B+C+D+E+F)	(±±							l	25,000	25,000
TOTAL CAPITAL COSTS (H = A+G)											\$2,000	52,000
NPII-21A.WOI												08-Jul-93
STRUCTURES DAA												

Cost Estimate - No Future Use, Manufacturing History Medium Group - Process History Subgroup Attentative No. 21A: Dismantling Consolidation

		3	1	Find	1907 (\$1		Exp/Red Mileage	Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost lien				Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT OR M COSTS (OPERATIONS)												
Dust & Safety Samp of Manuf Structures		4	_	7	3.75 /CY		1.000	1.000	1.000		2,703,000	2,639,000
Repair of Manufacturing Structures		∢	-	7	4.35 /CY	631,646 CY	1:000	000	1.000		3,136,000	3,061,000
Demolition		∢	_	7	11.02 /CV	631,646 CY	1.000	000	1.000		7,943,000	7,754,000
Loading Nonbazardous Debris		<	-	7	1.28 /CY	78,394 CY	1.600	1.000			183,000	179,000
Transportation of Nonhazardous Waste On-post	,	<	_	7		78,394 CY	1.600	1,000			492,000	481,000
Shredding Structure Debris		∢	_	7		78,394 CY	1.600	0001	1.000 Expansion		1,907,000	1,861,000
Debris Sampling, Manufacturing, Consolidation		۷	_	7	4.26 /CY	72,588 CY	1.300	000	1.000 Expansion		429,000	448,000
Loading Nombazardous Debris		<	_	7		72,588 CY	1.300	1.000	1.000 Expansion		138,000	135,000
Tennandation of Nonharardone Wests On north		<	_	~		72.588 CY	1,300	4.000	1.000 Expansion, Miles		370,000	362,000
Consolidation of Structural Material		<	-	. 7	7.26 /CY		1,000	1.000			000,109	287,000
Booldill of Characters Farmantion		: ∢	-	,		32.687 CY	1.000	1.000	1.000		300,000	293,000
Restoration of Structure Excavation		: <	_	7			1.000	1.000	1.000		3,000	3,000
	Subtotal (1)	£								1	18,236,000	17,802,000
DIRECTO&M REVENUES (OPERATIONS)												
Salvage of Metal		<	_	7	(52.61) /TON	38,407 TON	1.000	1.000	1.000		(2,306,000)	(2,251,000)
	Subtotal (T)	,									(2,306,000)	(2,251,000)
INDIRECT 0&M COSTS (OPERATIONS)	COSTCODE	MMMSST	_									
											365,000	356,000
Indirects, Overhead & Profit 39.0%											7,254,000	7,081,000
Engineering Design 0.0%	L = 0.000 * (I+J+K)										0 86	0
											7 563 000	7 383 000
Contingency 28.8%	N = 0.288 " (I+J+K+L+M)	•									om'rar'	200505
	Subtodal (O = J+K+L+M+N)	ź									15,635,000	15,262,000
DIRECT O&M COSTS (LONG-TERM ACTIVITIES)												
	Subtotal (P)	٤								0	0	٥
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES)	cost	0								•	•	,
erhead & Profit										0	0 0	<b>-</b>
Contingency 0.0%	R = 0.000 * (P+C)										5	•
	Subtotal (S)	E.								0	0	٥
										•	000 575	000 110 01
TOTAL ORM COSTS (T = I+F+O+P+S) [Note: Total ORM Annual Cost Only Includes Long-Term Activities]	tal O&M Annual Cost Only I	ncludes Lon	g-Tem A	<u>letivities</u>		- Annual Control of the Control of t				0	31,565,000	30,813,000
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (U = H+T)	IS (U = H+T)										31,600.000	30,900,000
NPH-21A.WOI												08-Jul-93
STRUCTURES DAA												

Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 1: No Action

		Cost Start End	ırt End	1992(\$)		Volume Mileage	Other	1995 (\$)	(\$) \$661	1995 (\$)
Cost Item		Type Ye	Type Year Year	Unit Cost Units	Quantity Units	Factor Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS No Action		0	0	0.00 /EA	- EA	000'1 000'1 000'1	1.000		0	0
	Subto	Subtotal (A)						ı	0	9
INDIRECT CAPITAL COSTS MANDEmoh		E LLSS							0	0
Indirects, Overhead & Profit Engineering Design	39.0% C = 0.390 * (A+B)	r							00	0 0
Criginating Design Resident Engineering	1.3% E = 0.013 * (A+B+C)	กก							0 (	0 (
Contingency		0 <del>1</del> 045							0	<b>-</b>
	Subtotal (G =B+C+D+E+F)	.D+E+F)							0	0
TOTAL CAPITAL COSTS (H = A+G).									0	9
NPH-01.WQ1 STRUCTURES DAA										07-Jul-93

Table C-15 Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 1: No Action

		ı	- 1							140 4 000 0	(# 300 c	1000
Cost lien		Cost	Start	Fnd Year	1992 (S) Unit Cost Units	Quantity Units	Exp/Red Mileage Factor Factor	Factor	Other Factor Description	Annual Cost	Total Cost	1995 (3) PW Cost
DIRECT O&M COSTS (OPERATIONS) No Action			I	,	0.00 /EA	I EA	1.000 1.000	1.000			0	0
ATIONS) 3.3%	(E)	SSTI									0 0	0 0
39.0% Design 3.0% jineering 1.3% 26.3%	K = 0.390 * (1+J) L = 0.030 * (1+J+K) M = 0.013 * (1+J+K) N = 0.263 * (1+J+K+L+M)										c	• • • •
Su DIRECT OR M COSTS (LONG-TERM ACTIVITIES) No Action	Subtotal (O = J+K+L+M+N)	0	0	1	0.00 /EA	- EA	1.000 1.000	000:1		0	0 0	0
										c	c	c
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES) Indirects. Overhead & Proft 39.0% G : Cortingency 26.3% R :	Survous (r) COST CODE ( G = 0.390 * (P) H = 0.263 * (P+Q)	Tr. S								00	0	00
	Subtotal (S)								ł	0	0	0
TOTAL OR M COSTS (T = 1+0+P+S)   Note: Total OR M Annual Cost Only Includes Long-Term Activities)	annual Cost Only Includes I	Ang-Ter	m Activ	ities						0	0	٥
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (U = 11+T)	H+T)										0	0
NPH-01.WQI STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 2A: Locks/Boards/Fences/Signs

Cool Num         Cool Num         Type         Year         Unit Cost   Units         Finder Erice         Finder Factor         Finder on Disability         Finder Factor         Finder on Disability         Find on Disability         Find on Disability         Find on Disability			Cost	t Start	End	1992 (\$)		Volume Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
15   1   16   17   170   1700   1700   1700   1,000	Cost Item		Typ	e Year	Year	Unit Cost Units	Quantity Units	Factor Factor	Factor Description	Annual Cost	Total Cost	PW Cost
Subtotal (A)   1.56 / SF   379.291 SF   1.000   1.00	DIRECT CAPITAL COSTS										900	000
1,000   1,00	Locks & Boards		S	-	1	1.86 /SF	379,291 SF		1.000		000,c08	000,008
Subteal (A)  Subteal (A)  OCSTOCK  1378 B = 0.037 (4,645.7)  349.06. 0.030 (4,645.7)  1.36. E = 0.013 (4,645.7)  26.39. (4,645.7)  27.30.	Fences & Signs		5.1		:	16.12 ALF	57,102 I.F		1.000		1,050,000	1,050,000
Subtotal (A)  1.855,000  1.354  8 = 0.033*(A)  3.355,000  1.355,00												
Subtoral (A)  COST CODE 3.3% B = 10.039 (A.B.) 3.3% B = 10.039 (A.B.) 3.3% E = 10.13 (A.B.+C.) 1.3% E = 10.13 (A.B.+C.) 2.5% F = 10.23 (A.B.+C.+C.+C.+C.) 2.6% F = 10.23 (A.B.+C.+C.+C.+C.+C.+C.+C.+C.+C.+C.+C.+C.+C.												
Subtotal (4)  COST CODE  1,655,000  1,000  3.954 B = 0.035 '(A)  3.955 B = 0.035 '(A)  3.955 B = 0.035 '(A)  3.955 B = 0.035 '(A-BLC)  1,356 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.035 '(A-BLC)  1,357 B = 0.0												
Subtodal (A)  COST CODE LLSS  3.3% B = 0.033 (A)  3.30% C = 0.390 (A+B)  3.00% C = 0.390 (A+B)  3.00% C = 0.390 (A+B)  3.00% C = 0.390 (A+B)  3.00% C = 0.390 (A+B)  3.00% C = 0.390 (A+B-C)  3.30% C = 0.013 (A+B-C-D-E)  3.30% C = 0.013 (A+B-C-D-E)  5.63% F = 0.263 (A+B-C-D-E-F)  Subtodal (G = B-C-D-E-F)  3.30% C = 0.013 (A-B-C-D-E-F)  3.30% C = 0.013 (A-B-C-D-E-F)												
Subtotal (A)   Subtotal (A)   1,655,000   LU     3.346												
COST CODE LLSS  3.3% B = 0.003*(A)  3.9% B = 0.003*(A+B-C)  3.0% D = 0.000*(A+B-C)  1.3% E = 0.013*(A+B-C)  26.3% F = 0.263*(A+B-C)  26.3% F = 0.263*(A+B-C-D-E)  Subtotal (G = A-C+D+E+F)  9.505.000  1.3% Subtotal (G = A-C+D+E+F)			Subtotal (A)								1,855,000	1,855,000
COSTCODE LLSS  GG000  39.0% C = 0.033*(A)  39.0% C = 0.030*(AB+C)  30.0% D = 0.030*(AB+C)  1.3% E = 0.013*(AB+C)  Subtobal (G =B+C+D+E+F)  Subtobal (G =B+C+D+E+F)  0.3505.000  3.3505.0000  3.3505.00000  3.3505.0000000000												
3.3% B = 0.033*(A) 74,000 74,000 74,000 74,000 74,000 74,000 74,000 74,000 74,000 74,000 75,0	INDIRECT CAPITAL COSTS	1900		(r								
39.0% C = 0.390*(A+B) 717,000 80,000 177,000 80,000 173,000 173% E = 0.013*(A+B+C) 173,000 173	MobOemob	B = 0.									60,000	00'09
3.0% D = 0.030*(A+B+C) 80,000 1.3% E = 0.013*(A+B+C) 73,000 26.3% F = 0.263*(A+B+C+D+E) 72,000  Subtotal (G = B+C+D+E+F) 1,505,000 1,505	Indirects Overhead & Profit		A+B)								747,000	747,000
1.3% E = 0.013*(A+B+C) 33,000 26.3% F = 0.263*(A+B+C+D+E) 729,000 26.3% F = 0.263*(A+B+C+D+E) 1,649,000 1,4 Subtotal (G = B+C+D+E+F) 3,505,000 3,4 0.000	Frainsering Design		(A+B+C)								80,000	80,000
26.3% F = 0.263 * (A+B+C+D+E) 729,000 1.4 Subtotal (G =B+C+D+E+F) 3.505,000 3.	Recident Engineering		A+B+C)								33,000	33,000
Subtatal (G =B+C+D+E+F) 3.505.000	Contingency		A+B+C+D+E								729,000	729,000
Subtobal (G =B+C+D+E+F) 1,549,000												
3.305.000		Subtotal (G =	=B+C+D+E+F)								1,649,000	1,649,000
											3 505 000	3 505 000
	TOTAL CAPITAL COSTS (H = A+G)										70000000	XXXXXX
	CW ACC. Hav											07-Jul-93
STRUCTURE	CTUTTIBLE DAA											
	STRUCTURES DAM											

Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 2A: Locks/Boards/Fences/Signs

	S	Cost Start			1992 (\$) This Cort Ilnits	Ousantity Ilnits	Exp/Red Mileage Factor Factor		Other Factor Description	1995 (\$) Annuel Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT O&M COSTS (OPERATIONS)								į				
IND/RECT O&M COSTS (OPERATIONS) MobDemob Indicate, Overlead & Proft Engineering Design Resident Engineering 0.0% Contingency 0.0%	Subotal (1)  Subotal	o									0 00000	0 0000
DIRECT O&M COSTS (LONG-TERM ACTIVITIES) Locks & Boards Feners & Signs	Subtotal (O = J+K+L+M+N)	٧ <	4 N	30	0.19 SF 1.61 J.F	379,291 SF 57,102 LF	1.000 1.	1.000.1	00071	R2,000 105,000	2,385,000	1,245,000

Subroal (P)	187,000	5,427,000	2,834,000
OSTS (LONG-TERM ACTIVITIES) grhead & Proft 39.0%	73,000	2,117,000	1,105,000
Contingency 30.0% H = 0.300* (P*4J)	151.000	4.380.000	2.287.000
SURVING (7) Total O.P.W. Total O.P.W. Annual Cost Only Includes I one-Term Activities	338,000	9,807,000	5,120,000
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+T)		13,300,000	8,630,000

NPH-02A.WOI STRUCTURES DAA

Table C-17 Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup
Alternative No. 19a: Dismantling Salvage, On-Post Nonhazardous Waste Landfill

Cost flem DIRECT CAPITAL COSTS		Cost Start	start End	ē	1992 (8)		Volume	_	Other	(\$) 6661	1995 (5)	1995 (\$)
DIRECT CAPITAL COSTS		Type	Type Year Year	ar	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
											;	;
Shredding Structure Debris		รา	_	;	0.31 /CY	30,759 CY	1.000		1.000		11,000	11,000
On-rost Nonhazardous Waste Landfill		S	_	:	4.32 /CY	28,242 CY	1.000		1.000		139,000	139,000
On-post Nonbazardous Waste Landfill Closure		ន	2	1	3.70 /CY	28,242 CY	1.000	1.000	1.000		119,000	114,000
	Subtotal (A)	_									269,000	264,000
STSCO PATRICIAL STATES	COSTODE	8										
33%	B = 0.033 * (A)	}									000'6	000'6
20 Oct 20 Ordin	- 0 300 * (A+FI)										108,000	106,000
80°C	0 = 0.000 * (A+B+C)										12,000	11,000
1.00	E-0013*(AtBaC)										2,000	2,000
26.3%	F = 0.263 * (A+B+C+D+E)	e									106,000	104,000
	•											
ď	Subtotal (G =B+C+D+E+F)	ċ									239,000	234,000
TOTAL CARITAL COSTS (4 - 4.6)											209,000	498,000
TOTAL CASTS IN EAST												

NPH-19A.WQ1 STRUCTURES DAA

07-Jul-93

Table C-17 Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup
Alternative No. 19a: Dismantling Salvage. On-Post Nonhazardous Waste Landfill

Cost less		Cost	Start	End	1992 (\$) Unit Cost Units	Ouantity Units	Exp/Red Factor	Exp/Red Mileage Factor Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECTOR M COSTS (OPERATIONS)		1	1									
Duet & Safety Samp of Manuf Structures		4	_	7		210,108 CY	1.000	1.000	1.000		899,000	878,000
Repair of Manufacturing Structures		< <	_	. 7	4.35 /CY		1.000	1.000	1.000		1,043,000	1,018,000
Demolition		<	_	2	11.02 /CY	210,108 CY	1.000	1.000	1.000		2,642,000	2,579,000
Loading Nonbazardous Debris		4	_	7			1.600	1.000			72,000	70,000
Transportation of Nonhazardous Waste On-post		<	-	7			1.600	4.000	1.000 Expansion, Miles		193,000	189,000
Shredding Structure Debris		∢	_	7			1.600	90.			000'84-/	000'06/
Debris Sampling, Nonprocess, Nonhaz Disposal		۷	-	7			1.300	000.			1,785,000	1,743,000
Londing Nonhazardous Debris		<	_	۲2			1.300	000.1			24,000	52,000
Transportation of Nonhazardous Waste On-post		4	-	7	0.86 /CY		1.300	4.000	1.000 Expansion, Miles		144,000	141,000
On-post Nonhazardous Waste Landfill		<	_	۲,			1.000	1.000	1.000		131,000	128,000
Backfill of Structure Excavation		<		7			1.000	000	1.000		139,000	135,000
Restoration of Structure Excavation		<b>Y</b>	_	7	0.08 /SF	15,101 CV	1.000	000.	1.000		000.	000'1
	Subtofal	_								j	7,852,000	7,665,000
		•								j		
DIRECT OR M REVENUES (OPERATIONS)		•		,	NOTE (1943)	MOT 032.21	50	5	w		(1 000 000)	(000 926)
Salvage of Metal		<	-	. 1	NO17 (10:7C)	NOT OCEAN	000.1	30:	2001		(amimati)	(poplar)
	Subtotal (I')									ļ	(1,000,000)	(976,000)
COSTS (OPERATIONS)	COSTODE	MMMSSI	<u> </u>								157,000	000 651
	J = 0.020 * (I)										3.123.000	3,049,000
Indirects, Overnead of Profit 59.0%											0	0
-											195,000	190,000
Confingency 28.8%		•									3,257,000	3,179,000
	9	5									6 7 3 7 000	6 \$72,000
DIBECT OF M COSTS (LONG. TERM ACTIVITIES)	SUCCOSI (C = J+N+L+M+N)	Ź.										
On-toost Nenbazardous Waste Landfill Closure		<	•1	30	0.13 /CY	28,242 CV	1.000	1.000	1.000	1,000	122,000	63,000
		4								9000	122,000	63,000
CONTACT ON A STREET CHANGE TO TO TO TO TO TO TO TO TO TO TO TO TO	Subfotal (F)	,							I	000 f		200100
Indirects, Overhead & Profit 39.0%	0=0									2,000	000'45	25,000
Contingency 30.0%										7,000	000,112	ooone e
	Subtotal (S)	e							I	3,000	98,000	\$1,000
TOTAL ORM COSTS (T = 1+1'+0+P+S) [Note: Total ORM Annual Cost Only Includes Long-Term Activities]	al O&M Annual Cost Only I	nctudes Lon	g-Tenn,	Activities						8,000	13,804,000	13,375,000
TOTAL CAPITAL COSTS AND TOTAL OF M COSTS (I) = II+TI	(T+II = II)										14,300,000	13,900,000
NPH-19A.WOI												07-Jul-93
STRUCTURES DAA												

Table C-18 Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 20a: Dismantling Salvage. Off-Post Nonhazardous Waste Landfill

Const base			Cost	Start End	End	1992 (\$) Unit Cost Units	Ouantity Units	Volume Factor	Mileage Factor	Other	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT CAPITAL COSTS				-		X.31 10 0	V.) 95° 01	-	8	8			11.000	11.000
Streeding Structure Debns Transfer Station			3 23		: :	0.24 /CY	28,242 CY	1.000	000	1.00			8,000	8,000
		Subtotal (A)	₹										19,000	19,000
INDIRECT CAPITAL COSTS MobDemob Indirects, Overhead & Proft Engineering Design Resident Engineering Contingency Contingency	3.0% 3.0% 1.3% 26.3%	COSTCODE B = 0.033 * (A) C = 0.390 * (A+B) D = 0.030 * (A+B+C) E = 0.013 * (A+B+C) F = 0.253 * (A+B+C)+E)	(F)										1,000 7,000 1,000 0 7,000	1,000 7,000 1,000 0 7,000
•			Œ.										16,000	16,000
DIRECT SUBCONTRACT CAPITAL COSTS	চ											·	0	0
		Subtotal (A1)										•	o	٥
INDIRECT SUBCONTRACT CAPITAL COSTS	STS		ه نیز										o	0
Contractor Markup Contractor Markup Engineening Design Resident Engineering	% % % ;		; 京宗·										0000	0000
Contingency	<b>6</b> .0	F1 = 0.000 * (A1+B1+C1+D1+E1) Suppose (G1 = B1+C1+D1+E1+E1)	71+01+E1) 01+E1+E1	_ =									0 0	0
TOTAL CAPITAL COSTS (H = A+G)				,							3		35,000	35,000

07-Jul-93

NPH-20A.WOI STRUCTURES DAA

Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 20a: Dismanling, Salvage, Off-Post Nonhazardous Waste Landfill

		1	Start	End	1992 (\$)		Ouentity Units	Exp/Red Factor	Mileage	Other	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
Cost Ilem		1/1/2	1	183	CIRCON CRIDS		Odline Villa							
DIRECTORM COSTS (OPERATIONS)		<	-	•	175 JFV	•	710 108 CV	1.000	1.000	1.000			899,000	878,000
Dust & Salety Samp of Manut Structures		< .		7		. •		900:	2	8			1001000	1.018.000
Repair of Manufacturing Structures		<	-	7		- '		000.1	30.	3 8			2612000	000 073 1
Demolition		<	-	7	11.02 /CY		210,108 CY	000.	000.	39.			33,000	70,000
Loading Nonhazardous Debris		<	-	7	1.28 /CY		30,759 CY	1.600	300	33.			0007/	00000
Transportation of Nonhazardous Waste On-post		¥	-	7	0.86 /CY		30,759 CY	009:	4.000	00:			193,000	189,000
Shredding Structure Debris		<	-	7				1.600	300.	3	Expansion		/40,000	000,000
Debris Sampling, Nonprocess, Nonbaz Disposal		∢	-	7				1.300	000.	8.9	Expansion		1,785,000	1,743,000
Loading Nonbazardous Debris		<b>V</b>	_	7			28.242 CT	006.1		3			000,50	2,000
Transfer Station		∢	-	۲1				1.300	900.	<u>.</u>			17,000	000'.
Transportation of Nonbazardous Waste Off-post		<	-	7	0.13 /CY			1.300	10.000	0001	Expansion, Miles		54,000	53,000
Backfill of Structure Excavation		<	-	7				1.000	900.	93.			000,851	000,00
Restoration of Structure Excavation		4	-	7	0.08 /SF		15,101 CY	1.000	1.000	1.000			1,000	000.1
	Subtotal (I)	_											7,648,000	7,466,000
CONDITION OF DOCUMENT OF THE CONTRACT OF THE C	metrone	TODWAN	<del>!.</del>											
INDIFFECT ORM COSTS (OPERATIONS)	0.000 FT	MINMA	-										153,000	149,000
erhead & Profit	K = 0.390 * (1-1)												3,042,000	2,970,000
	L = 0.000 * (I+J+K)												0 8	0 00 93
<b>5</b> 0	M = 0.018 * (I+J+K)												199,000	165,000
Contingency 28.8%	N = 0.288 * (I+J+K+L+M)	_											3,118,000	3,443,000
	Subtotal (O = J+K+) + M+N	Ş											6,503,000	6,348,000
DIRECT SUBCONTRACT ORM COSTS (OPERATIONS) Off-pirst Newhazardous Wastr Landfill	(S)	<	-	r)	7. 0S.t	۲	28,242 CY	1.000	1.000	1.000			145,000	142,000
													,	4 40 000
	Subtotal (I)												145,000	142,000
INDIRECT SUBCONTR. O&M COSTS (OPERATIONS)	s) costcode:	œ 												
MobDemob 0.0%	-												0	0
	K = 0.060 + (1.4J)												000'6	8,000
	L' = 0.000 * (l'+J'+K)												0	0
Hesiderit Engineering U.U.S. Oortingston 25,0%	N = 0.000 - (1 + 0.4K)	Ş											38,000	38,000
	200	•												
	Subtotal (O' = J'+K'+L'+M'+N')	(N+N											47,000	46,000
CONTRACTOR AND AND AND AND AND AND AND AND AND AND														
DIRECTORM REVENUES (OPERATIONS) Salvage of Metal		4	_	۲۱	(52.61)/TON		16,650 TON	1.000	1.000	1.000			(1,000,000)	(976,000)
													:	
	Subtotal (V)	_										!	(1,000,000)	(976,000)
TOTAL ORM COSTS (OPERATIONS) (P = 141+0+0+4)	ş												13,343,000	13,026,000
														9000
NPH-20A.WO!														30-Dec-1899

NPH-20A.WOI STRUCTURES DAA

		Cost Start	Start	End	1992 (\$)		Exp/Red Mileage Other	Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES)		7,00	lype trar trar	iz.	Unit Cost Units	Cuanary Cines	Journal		racor ractor Description	Author) Cost	I Otali COSI	100 m
										0	Þ	0
	Subtotal (Q)								·	0	0	0
INDIFIECT O&M COSTS (LONG-TERM ACTIVITIES) Indirects, Overhead & Proft 0.0%		0								0	0	0
Confingency 0.0%	S = 0.000 • (	,								0 (	0 (	0 (
	Subtotal (1)	_							•			7
TOTAL O&M COSTS_(LONG-TERM ACTIVITIES) (U = 0+T)	1(V = Q+D)									0	0	٩
TOTAL CAPITAL COSTS AND TOTAL O&M COSTS (U = H+P+U)	TS (U = H+P+U)							į			13,400,000	13.100.000
NPH-20A.WQ1 STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 21: Dismantling, Salvage, Clay Cap

			Cost Start End	Find	1992 (\$)		Volume Mileage	age Other	ber	1995 (\$)	(\$) 5661	1995 (\$)
Cost Item		-	Type Year Year	Year	Unit Cost Units	Ouantity Units	Factor Factor	•	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS Shredding Structure Debris			1.	i	0.31 /CY	30,759 CY	000'1 000'1		1.000		11,000	11,000
		Subtotal (A)									11,000	11,000
INDIRECT CAPITAL COSTS			rrss								c	c
MobDemob	30.08	C = 0.033 * (A)									4,000	4,000
Frommedia Design		D = 0.030 * (A+B+C)									0	0
Besident Engineering		E=0.013 * (A+B+C)									0	0
Contingency		F = 0.263 * (A+B+C+D+E)									7,000	4.000
	•										000'01	10,000
	,	Jamonai (a Loranza z.)										
TOTAL CAPITAL COSTS (H = A+G)											21,000	21.000
NPH-21,WQ1												07-Jul-93
STRUCTURES DAA												

Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 21: Dismantling, Salvage, Clay Cap

Fable C-19

		ı	1		(4) (00)		1 100	- Classic	Sheet	(3) 3001	1905 (\$)	1305 (\$)
150 E. H. H. H. H. H. H. H. H. H. H. H. H. H.		7 S	Year	Year	Unit Cost Units	Ouantity Units	Factor Factor		Factor Description	Annual Cost	Total Cost	PW Cost
JIRECT O&M COSTS (OPERATIONS)		i										
Dust & Safety Samp of Manuf Structures		<	-	7		210,108 CY	1.000	1.000	1.000		899,000	878,000
Repair of Manufacturing Structures		<	_	7	4.35 /CY	210,108 CY	1.000	1.000	1.000		1,043,000	1,018,000
Demolition		⋖	-	7	11.02 /CY	210,108 CV	000:1	1.000	1.000		2,642,000	2,579,000
Loading Nonbazardous Debris		∢	-	7		30,759 CV	1.600	0001	1.000 Expansion		72,000	70,000
Transportation of Nonhazardous Waste On-post		<	-	2		30,759 CY	1.600	4.000	1.000 Expansion, Miles		193,000	189,000
Shredding Structure Debris		<	-	2		30,759 CY	1.600	1.000			748,000	730,000
Debris Sampling, Manufacturing, Consolidation		∢	-	۲,		31,834 CY	1.300	000.1			201,000	196,000
Loading Nonhazardous Debris		<	-	7		31,834 CY	1.300	0001			000'09	29,000
Transportation of Nenhazardous Waste On-post		∢	_	2		31,834 CY	1.300	1.000	1.000 Expansion, Miles		162,000	129,000
Consolidation of Structural Material		<	_	7	7.26 /CV	25,181 CV	1.000	1.000	1.000		209,000	204,000
Clay Can		<	-	~	2.06 /SF	77,827 SF	1.000	1.000	1.000		183,000	179,000
Vegetative Cover for Cap		∢		7	0.38 /SF	77,827 SF	1.000	1.000	1.000		34,000	33,000
											6 447 000	6 293 000
	Subrotal (I)	_										
NRECT OR M REVENUES (OPERATIONS)											1	
Salvage of Metal		<	-	2	(52.61) /TON	16,650 TON	1:000	1.000	1.000		(1,000,000)	(976,000)
	Subtotal (I')	-									(1,000,000)	(976,000)
NDIRECT ORM COSTS (OPERATIONS)	COST CODE	MAINISST	F									
Mob/Demob 2.0%	J = 0.020 * (I)										129,000	126.000
erhead & Profit	K = 0.390 * (I+J)										2,565,000	2,504,000
	L = 0.000 " (I+J+K)										160,000	156.000
Hesiderit Engineering 1.8%	M = 0.018 * (14.04K)										2,674,000	2,610,000
S.O.O.Z	N = 0.200 (HOTINELTIN)											
	Subtotal (O = J+K+L+M+N)	5								1	5,527,000	5,396,000
JIRI-CT OR M COSTS (LONG-TERM ACTIVITIES)												
Clav Cap		<	7	30	0.09 SF	77,827 SF	1.000	1.000	1.000	8,000	232,000	121,000
Groundwater Monitoring		<	7	30	78,100,00 NEAR	1 YR	0001	1.000	00001	89,000	2,585,000	1,3-19,000
S-Year Site Review		<	7	30	5,400,00 YEAR	I YR	1.000	1.000	1.000	6,000	179,000	93,000
	Subtotal (P)	_							ı	103,000	2,995,000	1.564,000
TERM ACTIVI	COSTCODE	LIST								900	000 071 1	00001
Indirects, Overhead & Profit 39.0% Continuency 30.0%	Q = 0.390 * (P) R = 0.300 * (P+Q)									43,000	1,249,000	652,000
	•											
	Subtotal (S)	_							j	83,000	2,417,000	1,262,000
TOTAL O&M COSTS (T = 1+1'+0+1'+S) [Note: Total O&M Annual Cost Only Includes Long-Term Activity	O&M Annual Cost Only Incl	udes Long	Term Ac	tivities						187,000	16,387,000	13,539,000
CLU - 112 POOCTS AND TOTAL OR W COCTS 11 - 114.	£*n-:										16,400,000	13,600,000
IOIAL CAPITAL COSTS AND TOTAL CASTS	() = n+1,											

07-Jul-93

APH-21,WQ1 STRUCTURES DAA

Table C-20 Cost Estimate - No Future Use, Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 21A: Dismantling Salvage. Consolidation

			Cost Start End	lart	P	1992(\$)		Volume Mileage	Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			Type Year Year	rar Ye	ĕ	Unit Cost Units	Quantity Units	Factor	Factor	Factor Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS Shredding Structure Debris			เ	_	:	0.31 /CV	30,759 CY	1.000	1.000 1.000	1.000		11,000	11,000
		Subtotal (A)	_									11,000	11,000
INDIFFECT CAPITAL COSTS		COSTCODE	รราา									í	•
Mob/Derrob		B = 0.033 * (A)										0 8	0 6
Indirects, Overhead & Profit Engineering Design	96.96 86.96	$C = 0.390 \cdot (A+B)$ $D = 0.030 \cdot (A+B+C)$										90°*	0
Resident Engineering		E = 0.013 * (A+B+C)									٠	0	0
Contingency		F=0.263*(A+B+C+D+E)	(1)									4,000	000 <del>'</del> 7
		Subtotal (G =B+C+D+E+F)	Œ									10,000	10,000
TOTAL CAPITAL COSTS (H = A+G)												21,000	21,000
NPH-21A.WOI													07-Jul-93
STRUCTURES DAA													

Cost Estimate - No Future Use. Manufacturing History Medium Group - Nonprocess History Subgroup Alternative No. 21A: Dismantling Salvage. Consolidation

		Cost	Start	End	1902 (\$)		Exp/Red Mileage	Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			•	Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECTOR M COSTS (OPERATIONS)												
Part & Sefety Samp of Manuf Structures		<	_	7		210,108 CY	1.000	000.	0001		899,000	878,000
Remain of Manufacturing Structures		∢	_	7	4.35 /CY	210,108 CY	1.000	1.000	1.000		1,043,000	1,018,000
Demolition		<	_	7	11.02 /CY	210,108 CY	1.000	1.000	1.000		2,642,000	2,579,000
Losting Nonhagardous Debrie		<	_	2	1.28 /CY	30,759 CY	1.600	1.000	1.000 Expansion		72,000	70,000
Transmostation of Nonhazardous Waste Op. post		~	-	7		30,759 CY	1.600	4.000	1.000 Expansion, Miles		193,000	189,000
Shredding Structure Debris		<		2		30,759 CY	1.600	1.000			748,000	730,000
Debris Sampling Manufacturing Consolidation		<	_	2	4.26 /CY	28,242 CY	1.300	1.000	1.000 Expansion		178,000	174,000
Lording Nonbarardone Debrie		<	-	2		28,242 CY	1.300	1.000	1.000 Expansion		24,000	22,000
To the state of th		: <	-	٠,			1.300	4,000	1.000 Expansion Miles		144,000	141,000
transponduce of temperations waste our post		< <		. ~	7.36 /CV		1.000	1.000			234,000	228,000
Consolioation of Seuchtral Material		< <		, ,			1 000	000	1.000		139,000	135,000
Backfull of Structure Excavation		< <		۰,			000	000	000		1,000	1,000
Restoration of Structure Excavation		•	-	1								
	Subtotal (1)	_								1	6,348,000	6,197,000
DIRECT O&M REVENUES (OPERATIONS)											() 000 000	(000 )(0)
Salvage of Metal		∢	_	۲،	(52.61) /TON	16,650 ION	000.1	000	000.1		(000,000,1)	(mnn.c)
	Subtetal (I')	.=									(1,000,000)	(976,000)
INDIRECT O&M COSTS (OPERATIONS)	COSTCODE	MMMSST	_									
2.0%	J = 0.020 • (i)										127,000	124,000
Indirects, Overhead & Profit 39.0%	K = 0.390 * (!+J)										2,525,000	000,004-2
<b>%</b> 0:0	L = 0.000 * (1+J+K)										0 00	0
1.8%	M = 0.018 * (I+J+K)										157,000	3 \$70,000
Contingency 28.8% P	N = 0.288 * (I+J+K+L+M)										7,033,000	7314600
		:									5,442,000	5.313.000
SHIVITED AN COSTS OF ONG TERM ACTIVITIES	SUDDICE (U = J+K+L+M+N)	Ž.								l		
DIRECTORM COSTS (LONG-TERM ACTIVITIES)												
	Subtotal (P)	_								0	0	8
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES)	COSTCODE	0									,	•
	Q = 0.000 * (P)									0	0	•
960:0	R = 0.000 * (P+Q)									Đ	Þ	•
	Subtotal (S)	_								0	0	0
TOTAL OR M COSTS (T = 1+1'+0+P+S) [Note: Total OR M Annual Cost Only Includes Long-Term Activities]	O&M Annual Cost Only In	cludes Lon	g-Tenn	Activities						0	10,791,000	10,534,000
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+T)	(U = H+T)										10,800,000	10,600,000
NPH-21A.WOI												07-Jul-93
STRUCTURES DAA												

Cost Estimate - No Future Use, Agent History Medium Group Alternative No. 1: No Action

			Cost Start	End	1902 (\$)		Volume Mileage	1		1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			Type Year Year	Year	Unit Cost Units	Quantity Units	Factor Factor		Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS No Action			0 0	ı	0.00 /EA	- EA	1.000 1.000	000 1.000			0	0
		Subtotal (A)								1	0	٩
INDIRECT CAPITAL COSTS		COSTCODE	2								•	,
Моб/Оетор		B = 0.000 * (A)									<b>-</b>	0 0
Indirects, Overhead & Profit		C = 0.000 * (A+B)									o 0	0
Engineering Design Resident Frontineering		E=0.000 * (A+B+C)									0	0
Contingency	90.0 F	F = 0.000 * (A+B+C+D+E)									0	0
	s	Subtotal (G =B+C+D+E+F)									0	0
TOTAL CAPITAL COCTE AL. A.C.											0	0
												07-Jul-93
A-01.w01												

A-01.WQI STRUCTURES DAA

Cost Estimate - No Future Use, Agent History Medium Group	Alternative No. 1: No Action
Table C-21	

Alternative No. 1: No Action	=										
Cost bear		Cost	Start F	Find	1992 (\$) Unit Cost Units	Ouantity Units	Exp/Red Mileage Factor Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT ORM COSTS (OPERATIONS) No Action			I	i i	0.00 /EA	- EA	1.000 1.000	0001		0	0
INDIRECT O&M COSTS (OPERATIONS)  MobDernob Indirects, Overhead & Proft  Engineering Design  Resident Engineering  0.0%	Subtotal (1)  COST CODE  J = 0.000 * (1)  K = 0.000 * (1-1)  L = 0.000 * (1-1)  M = 0.000 * (1-1)	2							1 .	0 0000	0 0000
Contingency 0.0% DIRECT O&M COSTS (LONG-TERM ACTIVITIES) No Action	N = 0.000* (h+)+K+L+M) Subtotal (D = J+K+L+M+N)	0	c	;	0.00 /F.A	<u> </u>	1,000	0001	•	0 0	0 0
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES) Indirects, Overhead & Proft Contingency 0.0%	Subtout (P)  COST CODE  Q = 0.000 * (P)  R = 0.000 * (P+Q)	2						1	0 0	0 00	0 00
	Subtotal (S)	ı						i	0	0	
TOTAL ORM COSTS (T = 1404P4S). [Note: Total ORM Annual Cost Only Includes Long-Term Activities] TOTAL ORDITAL CYSTS AND TOTAL ORM COSTS (II = 14.1).	M. Annual Cost Only Includes L (1) = 14+T.	ong-Tr	m Activ	lies						0	0

07-Jul-93

A-01.W01 STRUCTURES DAA

Table C-22 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 4: Hot Gas, Dismantling, On-Post Hazardous Waste Landfill

			Cost Start	1	End	1992(\$)		Volume Mileage	Wilcage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost frem			Type		Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS												;	•
Acent Monitoring			15	_	;	2.29 /CY	12,777 CY	1.000	90 <u>.</u>	1.000		190,000	000061
Hot Gas for Agent Structures			57	-	;	0.81 /SF	1.667,905 SF	1.000	00.	000.1		1,542,000	1,542,000
Acces Menioring			S	_	;	2.29 /CY	72,777 CY	1.000	1.000	1.000		190,000	190,000
Simonia in the second			2	-	:	2.39 //CV	72.777 CY	1.000	0001	1.000		190,000	190,000
Agent Montrountg			3 1			Y. 17. 2	V) TIT (L	9	000	1,000		475,000	475,000
On-post Hazardous Waste Landfill			3 :		:	3.72 .01	20 11171	000	8 6	000		316,000	286,000
On-post Hazardous Waste Landfill Closure	sure		S	₩1	;	5.80 /CY	10 1117	000.1	2007	900:1			
		Subtotal (A)	F								1	2,903,000	2,874,000
INDIRECT CAPITAL COSTS		COSTCODE	CHSS										
Mob/Demob	4.5%											131,000	129,000
Indirects Overhead & Profit	30.05	C=0.390*(A+B)										1,183,000	1,1/1,000
and the property of the proper	200											274,000	271,000
Engineering Design	800											74,000	73,000
Resident Engineering	88.0	E = 0.018 * (A+B+C)	Ģ									1,369,000	1,356,000
Commigation	200		ĵ										
		Supportation - Bacachae	G.									3,031,000	3,000,000
TOTAL CAPITAL COSTS (H = A+G)												5,934,000	5,874,000
A-04-WO1													07-Jul-93
,													

STRUCTURES DAA

Cost Estimate - No Future Use, Agent History Medium Group Alternative No. 4: Hot Gas, Dismantling, On-Post Hazardous Waste Landfill

		- 1			(4) 6000		Canabad Milan	-	240	1005 (€)	13005 (\$)	(3) 5001
Cost Item		7. S.	Start Y car	Year	1992 (3) Unit Cost Units	Quantity Units	Factor		Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT O& M COSTS (OPERATIONS)												
Agent Monitoring		۷	-	7			0001	1.000	1.000		1,871,000	1,827,000
Repair of Agent Structures		<	_	•	5.28 /CY		1.000	000	1.000		3,456,000	3,294,000
Hot Gas for Apent Structures		<	_	•	15.96 /SF	1,667,905 SF	1.000	1.000	1.000		30,378,000	28,954,000
Agent Monitoring		٧	-			12,717 CY	1.000	1.000	1.000		1,871,000	1,783,000
Air Complian		•	-	-		3 Y.R	1.000	1.000	1.000		10,068,000	9,596,000
Demolisher of Acout Christians		< <			23.31 CY	573.624 CY	000	000.1	1.000		15,259,000	14,544,000
For the property of the party o			-				1 600	000	1.000 Exmension		206,000	196,000
LOAGING HAZARONUS DEORIS		( <					091	00			2.994,000	2.854,000
Agent Montioning	•			•			8	00			28 310 000	26 98J 000
Debris Sampling, Process/Agent, Haz Disposal	28	٠ ٠		<b>-</b> -	73.03 70.1		009	80.			269 000	542,000
Iransportation of Hazardous Waste Un-post		< ⋅		٠.			900.	200			338 000	33,7000
On-post Hazardous Waste Landfill		∢	_	m			000.	3	000.1		239,000	32,4000
Backfill of Structure Excavation		<	_	•			000.	000	1.000		1 /4,000	160,000
Restoration of Structure Excavation		∢	-	٣	0.08 /SF	18,978 CY	1.000	0001	1.000		2,000	2,000
	Subtotal (I)	€									95,496,000	91,063,000
XOSTS (OPERATIONS)		HMLMST	-								000 010	000 100 1
											1,910,000	000,128,1
& Profit	39.0% K=0.390*(I+J)										000,000,00	0
											3 0.16 000	2 005 000
Resident Engineering Continuency	2.3% M = 0.023 * (I+J+K) 32.5% N = 0.325 * (I+J+K+L+M)	<b>≨</b> +									44,993,000	42,905,000
	Subtotal (O = J+K+L+M+N)	+M+N)								ļ	87,937,000	83,856,000
DIRECT O&M COSTS (LONG-TERM ACTIVITIES)	TIES)											000 674
On-post Hazardous Waste Landfill Closure		∢	7	30	0.13 CV	72.77 CY	1.000	1.000	1.000	11,000	313,000	163,000
							,					
	Subtotal (P)	٤								11,000	313,000	163,000
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES)	TSOO	LIST										
Indirects, Overhead & Profit 3 Contingency 3	39.0% Q = 0.300 ° (P) 30.0% R = 0.300 ° (P+C)									4,000 5,000	122,000	68,000
	Subtobal (S)	(S)							1	6,000	253,000	132,000
TOTAL OR M COSTS (T = 1+0+P+S)   Note: Total ORM Annual Cost Only Includes Long-Term Activities	Total O&M Annual Cost Only	Includes Long-	Icm Ac	tivities						20,000	183,999,000	175,215,000
TOTAL CAPITAL COSTS AND TOTAL O&M COSTS (U = H+T)	COSTS (U = 11+T)										190,000,000	181,000,000
												07-111-93
A-04.WOI STRUCTURES DAA												

Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 6: Hot Gas, Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

DIRECT CAPITAL COSTS		<u> </u>	Start	Fnd Year	1992 (\$) Unit Cost Units	Ouantity Units	Volume	Mileage Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
			1					Ì	500.		900 001	000
Agent Monitoring		3 :	_ •	:	2.29 /CY	17/1/17/	000:		0001		1 542 000	1 32 000
Hot Gas for Agent Structures		3 :	4	:	0.81	1,00/,001	000.	000:1			1,74,000	0007661
Agent Monitoring		S :	٦.	:	2.78 /CY	12/11 CY	300		1.000 Expension		247,000	214,000
Agent Monitoring		3	7	!	772 VCY	17/11	005.1				000'157	214,000
On-post Nonbazardous Waste Landfill On-post Nonbazardous Waste Landfill Closure		ನನ	9 ~	: :	4.32 /CY 3.70 /CY	72,117,CY	0.700	000:	1.000 Reduction		215,000	161,000
	Subrotal (A)	_									2,693,000	2,306,000
	Subtotal (A	-									2000 CCO 49	21,200,000
		LHINS									121,000	104,000
Indirects, Overhead & Profit 37.8% Engineering Design 6.5%											1,062,000	216,000
Dî:		េ									72,000 1,238,000	62,000 1,061,000
	Subtotal (G =B+C+D+E+F)	ė									2,746,000	2,352,000
DIRECT SUBCONTRACT CAPITAL COSTS On post Rolary Kiln Incineration		ន	9	;	36.37 (CY	, 1277 CY	Y 1.000	1.000	1.000		3,021,000	2,367.000
	Sufficial (A1)										3,021,000	2,367,000
	(iv)											
INDIRECT SUBCONTRACT CAPITAL COSTS  MobDemob Contractor Markup Engineering Design Resident Engineering 30% Contingency 300%	COSTCODE: C 6 B1 = 0.020*(A1) 6 C1 = 0.100*(A1+B1) 6 D1 = 0.020*(A1+B1+C1) 6 E1 = 0.000*(A1+B1+C1) 7 E1 = 0.300*(A1+B1+C1+D1+E1)	C C +D1+E1)									60,000 308,000 305,000 102,000 1,139,000	47,000 241,000 239,000 60,000 892,000
	Subtotal (G1 = B1+C1+D1+E1+F1)	71+E1+F1)									1,914,000	1,500,000
TOTAL CAPITAL COSTS (H = A+G)											10,373,000	8,525,000
A-06.WQ1 STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 6: Hot Gas, Dismantling, On-Post Rolary Kiln Incineration, On-Post Nonhazardous Waste Landfill

Cost hem		Cost	Start Year	End Year	1992 (\$) Unit Cost Units	Quantity Units	Exp/Red Factor	Mileage Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
DIRECT O&M COSTS (OPERATIONS)		i .				200 000		98	000		000120	1 877 000
Agent Monitoring		< ٠		7 -	22.53 /CY	12111 CA	8 5	900	1,000		3.456.000	3,294,000
Repair of Agent Structures		< <		n ve	15.96 AF		1.000	1.000	1.000		30,378,000	25,012,000
Agent Monitoring		<b>.</b> ✓	_	7		72,777 CV	1.000	1.000	1.000		1,871,000	1,827,000
Air Sampling		∢.	<b>-</b> 7 ·	۰ و	2,9.10,789.00 /YR	3 YR	00.1	000	1.000		10,068,000	8,289,000
Demolition of Agent Structures		۷ ۰	7 (	c r	23.31 /CY	3/3,624 (1	0091	8 5	1.000 Ferransion		170.000	130,000
Loading Nonbazardous Debns		< <	7	ی .			1.600	000.	1.000 Expansion		2,994,000	2,465,000
Debris Sampling, Process/April, Haz Disposal		: ∢	۰	7			1.600	1.000			28,310,000	21,654,000
Transportation of Hazardous Waste On-most		<	9	7	1.07 /CY	72,777 CV	1.600	4.000	1.000 Expension, Miles		269,000	435,000
Debris Sampling, Process/Agent, Haz Disposal		٧	9	7			009	1.000			28,310,000	21,65-1,000
Loading Nonhazardous Debris		<	9	7	1.28 /CY		1.300	0001	1.000 Reduction		138,000	106,000
Transportation of Nonhazardous Waste On-post	-	<	9	7			1.300	000.			93,000	7,000
On-post Nonhazardous Waste Landfill		<	9	7			1.300	000.			174 000	000111
Backfill of Structure Excavation		< <	<del>-</del> -	<b>د</b> د	8.05 CY	18978 CV	000:1	98.1	1.000 Reduction 1.000		2,000	000,1
Krstoration of Structure Excavation		•	ŧ	5								
	Subtotal (f)	6									125,421,000	100,815,000
(SWOT ABIDDA STROOMSO TOBONING	COSTONE	HM! MST	<b>-</b>									
MobDemob 2.0%	J= 0.0										2,508,000	2,016,000
& Proft											49,892,000	40,104,000
											001001	3 216 000
Resident Engineering 2.3% Contingency 32.5%	% M = 0.023 * (I+J+K) % N = 0.325 * (I+J+K+L+M)	•									57,792,000	46,454,000
											0001011	900
	Subtotal (O = J+K+L+M+N)	Ę								1	114.194.000	91.791.000
DIRECT SUBCONTRACT O&M COSTS (OPERATIONS)	ions)	4	vo	7	£178	12.77 CV	1.000	1.000	1.000		11,989,000	9.170,000
CHICKS KNALV NIII INCINCIALION		:	>									
											44.000.000	00000
	Subtotal (I)									1	000/505/11	20000116
INDIRECT SUBCONTR. O&M COSTS (OPERATIONS)	NS) COSTCODE	ن نن										
MobDemob 0.0%											0	0
											1,199,000	917,000
Engineering Design 0.0%	% L = 0.000 * (I+J+K)										264,000	202,000
•		·M)									5,381,000	4,116,000
	Subtodal (O' = J'+K'+L'+M'+N')	N+.X									6.843.000	5.234.000
		•										
DIRECT OR M REVENUES (OPERATIONS)											0	0
	Subtotal (V)	د									0	0
TOTAL 08M COSTS (OPERATIONS) (P = 141'+0+0'+V)	O,+XV										258,447,000	207.011.000
												10. Dec. 1800
A-06.WQI STRUCTURES DAA												

Table C-23 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 6: Hot Gas, Dismantling, On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

		Cost	Cost Start End	End	1992 (\$) This Cost Thits	Ouentite l'hije	Exp/Red Factor	Exp/Red Mileage Other Factor Factor Factor	Other Factor Description	1995 (\$) Annual Cost	1995 (\$) Total Cost	1995 (\$) PW Cost
INDIRECT ORM COSTS (LONG-TERM ACTIVITIES) On-post Nonhazardous Waste Landfill Choure	:	<b>*</b>	-	8	0.13 /CY	72777 CY	1.000	1.000	1.000	11,000	259,000	117,000
	Subtobal (Q)									11,000	259,000	117,000
INDIFECT O&M COSTS (LONG-TERM ACTIVITES) Indirects, Overhead & Proft 36.0% Contingency 30.0%	COST CODE R = 0.390 * (Q) S = 0.300 * (Q+R)	LISL								4,000	101,000	46,000 19,000
	Subtotal (T)	_								67000	209,000	94,000
TOTAL ORM COSTS (LONG-TERMACTIVITIES) (U = Q+T)	U=0+D						:			20,000	468,000	211,000
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+P+U)	.(U = 11+P+U)		:								269,000,000	216.000.000
A-06.WQI STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Agent History Medium Group Alternative No. 14: Dismantling On-Post Hazardous Waste Landfill

			Cost Start		End	1992(\$)		Volume Mileage	Milcage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			Type		icar	Unit Cost Units	Ouantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS												000 000	000 000
Agent Monitoring			ដ	_	:		72.77 CY	1.000	90.1	0007		000'061	00000
Agent Monitoring			S	-	1		12111 CY	300.	33.			150,000	190,000
On-most Nombazardous Waste Landfill			2.1	-	:		12.777 CV	1.000	1.000	1.000		329,000	359,000
On-post Nonbazardous Waste Landfill Closure	surc		រ	7	;	3.70 /CY	72.77 CY	1.000	1.000	000.1		307,000	293,000
		Sultrotal (A)	_									1,046,000	1,032,000
INDEPET CAPITAL COSTS		COSTODE	8										
	200	D-0003*(A)										34,000	34,000
Mod/Leffood		(A) (A)										421,000	415,000
		0.000 (A.b.)										45,000	44,000
		D=0.000 (A+0+C)										19.000	19,000
Confinency	8 5° 5°	F=0.063*(A+B+C+D+F)	•									411,000	405,000
			ì										
		Subbbal (G=B+C+D+E+P	Ģ									930,000	917,000
TOTAL CAPITAL COSTS (H = A+G)												1,977.000	1,949,000
													07-Jul-93

A-14.WQ1 STRUCTURES DAA

Cost Estimate - No Future Use, Agent History Medium Group Alternative No. 14: Dismantling, On-Post Hazardous Waste Landfill

ble C-24

		3	130		1003/60		Con/Dad Miles	L	0.6	(3) 3001	1000 (€)	(3/3001
				Y 23	Init Cott Unite	Ovantity Units	Factor 1		Outr Factor Description	Annual Cost	Total Coet	1993 (a) PW Cost
RECT OF M COSTS (OPERATIONS)			1				1	1	The state of the s	Transport of the state of the s		
A cent Menitorine		•	-	•	7.7 St. (CV.	V) 111 CV	100	8	1000		000 178 1	1 827 000
Dennis of Acest Structures		٠.		۰,		A) F(91/2)	200:	8	0001		3.456.000	3 274 000
the state of the s		: •				a value	000		9001		000'05'1	0001121
Aur Sampung		⋖	-	7	2,940,169,00 /TR		90.1	3	000.1		0,/12,000	0,332,000
Demolition of Agent Structures		<	_	7		573,624 CY	000	000			15,259,000	14,895,000
Loading Hazardous Debris		∢	_	7			1.600	90.			206,000	201,000
Agent Monitoring		∢	_	7			1.600	0001	1.000 Expansion		2,994,000	2,923,000
Debris Sampling, Process/Agent, Haz Disposal		4	-	7	213.05 /CY	72.777 CY	1.600	1.000	1.000 Expansion		28,310,000	27,636,000
Transportation of Hazardous Waste On-post		⋖	_	7	1.07 /CY	12777 CY	1.600	4.000	1.000 Expansion, Miles		269,000	555,000
On-nost Hazardous Waste Landfill		٧	_	,			1,000	000			138 000	330.000
Rockfill of Structure Evensation		: ◄		,			1 000	2	1 000		174 000	170,000
Description of Countries Countries		: <					0001		000		0001	0001
Kesk(dranen el Sifuctura Excavanon		<	-	,			36.	90.	00.1		7,000	7000
	€									i	59,891,000	58,465,000
OSIS (OPEHA IIONS)	# A	HMLSSI										
2.0%	J = 0.020 * (I)										1,198,000	1,169,000
& Profit 39.0%	K = 0.390 * (I+J)										23,825,000	23,257,000
Engineering Design 0.0%	L = 0.000 * ((+J+K)										0 000 000	0 000 859 1
31.38	N = 0.313 * (1+3+K+1 +M)										27.066.000	26.422.000
	Subtotal (O = J+K+L+M+N)									I	53,787,000	52.506.000
Character (Costs) (LONG-TERM ACTIVITIES) On-most flazardous Waste Landfill Closure		<	7	ç	0.13 CV	72.77 CY	0001	000	0001	11.000	313.000	163.000
			ı									
SECT OF A CASE TERM ACTIVITIES	Subtotal (P)	10 11							ı	11.000	313,000	163,000
	0.030.4P	1								9004	122,000	00019
30.0%	R = 0.300 * (P+Q)									2,000	131,000	68,000
	Subtotal (S)								•	0006	253,000	132,000
JTAL ORM COSTS (T = 1+0+P+S) [Note: Total ORM Annual Cost Only Includes Long-Term Activities]	M Annual Cost Only Include	s Long-Te	rn Activ	ities						20,000	114,243,000	111,267,000
JTAL CAPITAL COSTS AND TOTAL ORM COSTS (U = H+T)	U=H+D										116.000.000	113.000.000
				ĺ								

07-Jul-93

14.WQ1 RUCTURES DAA

Table C.25 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 15: Dismantling On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

		Cost	Start	End	1992 (\$)		Ouzutity Units	Volume	ne Mileage	Factor Description	1995 (\$)	1995 (\$) Total Cost	1995 (\$) PW Cost
Cost Item		ž.	rear	LLar	CILI CON CIII		Committee		1	1			
DIRECT CAPITAL COSTS		31	-		٧٦/ ٥٠ د		V) 111 CV	200	0001			190,000	190,000
Agent Monitoring		3 5		:	2.27 /21		77.77 CV	0001		901		190,000	190,000
Agent Monitonng		3	-	:	77 677		17/1/	YO		200:		900 161	000 100
On-post Hazardous Waste Landfill		S :	<del>-</del>	:	5.72 /CV		12,111 CV	0.700	000:	1.000 Reduction	£ '	355,000	000,184
On-post Hazardeus Waste Landfill Closure		ថ	-	:	3.80 / C.		17 111 61	7.0			ŧ		
	Subtotal (A)	_										934,000	832,000
	(A) IBOTOR												
STOCK LATERACT TOURISM	Hoostoop	00											
INDIFFICULTIAL COSTS	a 0	5										30,000	27,000
erhead & Profit												376,000	335,000
												40,000	36,000
5												17,000	15,000
		Œ.										362,000	323,000
		١										826,000	737,000
	Suppose (G =C+C+C+E+F)	ŗ											
DIRECT SUBCONTRACT CAPITAL COSTS		2				Ş	:	-	2	1 000 Evansion		3927 (101)	3392 000
On-post Rolary Kish Incineration		3	7	:	30.37	-	1				Į.		
												3007000	3.392.000
	Subtotal (A1)										-	200,136,0	2005
INDIBECT SUBCONTRACT CAPITAL COSTS	SOSTOODE	Ü											
Mob/Demob 2.0%	B1 = 0.020											79,000	68,000
Confractor Markup 10.0%												401,000	346,000
	5% D1 = 0.046 * (A1+B1+C1)	_										201,000	174,000
	2% E1 = 0.030 * (A1+B1+C1)	_										132,000	114,000
Confingency 1.1%		, -D1+E1)										52,000	45,000
	Subtotal (G1 = B1+C1+D1+E1+F1)	H+E1+F	<b>=</b>								•	964,000	747.000
TOTAL CAPITAL COSTS (H = A+G)												6.551,000	5,708,000
													07-Jul-93
A-15.W1													

Cost Estimate - No Future Use. Agent History Medium Group
Alternative No. 15: Dismantling On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

		.			1974007		9			1005 (\$)	1905 (\$)	1305 (\$)
Cost Item			Year	Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT OR M COSTS (OPERATIONS)				,			8	8	900		1 871 000	1 837 000
Agent Monitoring		< ∙	- •	~ ~	22.53 /CY 5.30 /CV	N 11171	99.1	8 6	1000		3.456.000	2.846.000
Kriperr of Agent Structures		< •		o 4	3.28 ACT		8	8	0001		10.068,000	8,289,000
Air Sampling Demolition of Agent Structures		< <	7 7	o vo	23.31 /CY	573,624 CY	000.1	000.	0001		15,259,000	12,563,000
Loading Hazardous Debris		<	4	7			1.600	1.000	1.000 Expension		206,000	166,000
Agent Monitoring		∢	-	7	22.53 /CY		1.000	00.			1,871,000	1,827,000
Debris Sampling, Process/Agent, Haz Disposal	_	∢ •	7,	r 1	213.05 /CY	72 117 CV	09:1	000.1	1.000 Expansion 1.000 Expansion Miles		28,310,000	457,000
Iransportation of Hazardous Waste On-post		< •	<del>,</del> -	- 1			0091				28 310 000	22.763.000
Debns Sampling, Process/Agent, Haz Lusposai	_	< •	, .	٠,	1 56 505		909.1				206,000	166,000
Loading Hazardous Debris Transportation of Nonbayardous Waste On-most	10	< 4	7 77	- ~	1.35 /CT 0.86 /CY		000.1	4.00	1.000 Reduction, Miles		284,000	230,000
On rect Nonharandous Waste Landfill		. ∢	٠-1	7	107 /CY		0.700	000.1			237,000	190,000
Backfill of Structure Excavation		: ∢	• •	ۍ	8.05 /CY		1.000	1.000			174,000	144,000
Restoration of Structure Excavation		4	7	¥	0.08 /SF	18,978 CY	1.000	1.000	1.000		2,000	1,000
	Subtotal (I)	€									90,825,000	74,232,000
			ļ									
XOSTS (OPERATIONS)		HMMMSI	MST								1 816 000	1.185.000
MobDemob 2:0% Indirects Overhead & Proff 40.3%	78 J = 0.020 * (I)										37,288,000	30,476,000
											0	0
jineering		•									2,923,000	2,389,000
Contingency		(w+-										
	Subtotal (O = J+K+L+M+N)	+M+N)								İ	84,255,000	68,863,000
SACT SECTION STATEMENT AND TOTAL STATEMENT STA	CAIS											
On-post Retary Kiln Incineration	foaci	∢	7	7	144,36 /CY	72,777 CV	1.000	1.000	00071		11,989,000	9,640,000
	Subtotal (1)									1	11,969,000	9,640,000
INDIRECT SUBCONTR OWN COSTS (OPERATIONS)	SACOTOO	0										
Moh/Demob 0.0%	J' = 0.000										0	0
	% K = 0.100 * (l'+J)										000,881,1	964,000
Engineering Lesign U.U% Resident Engineering 2.0%		- 0									264,000	212,000
Contingency 40.0%	P8 N' = 0.400 * (I'+J'+K'+L'+M)	+L'+M)									5,381,000	4,327,000
	Subtotal (O' = J'+K+L'+M'+N')	L.+M.+N)								1	6,843,000	5,503,000
DIBECT OF W BEVENIES (OBERATIONS)												
DIRECTOR MEVENCES (OFF. MATIONS)											0	0
	Subtotal (V)	ક								1	0	0
TOTAL O&M COSTS (OPERATIONS) (P = 1+l'+O+O'+V)	( <b>\</b> ^+.0+										193,912,000	158,237,000
												400
A-15.W1 STRUCTURES DAA												30-Dec-1899

Table C-25 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 15: Dismantling On-Post Rotary Kiln Incineration, On-Post Nonhazardous Waste Landfill

Cost Item		Cost	Cost Start End Type Year Year	End	1992 (\$) Unit Cost Units	Ovantity Units	Exp/Red Factor	Exp/Red Mileage Other Factor Factor Factor	Other Factor Description	1995 (\$) Amuel Cost	1995 (\$) Total Cost	1995 (S) PW Cost
INDIFECT O&M COSTS (LONG-TERM ACTIVITIES) On-post Nombazardous Waste Landfill Closure		∢	7	30	0.13 /CY	יט יהרבר	1.000	1.000	1.000	11,000	259,000	117,000
	Subtobal (C)									11,000	259,000	117,000
INDIRECT O&M COSTS (LONG-TERM ACTIVITES) Indirects, Overhead & Proft 39.0% Contingency 30.0%	COST CODE R = 0.390 * (Q) S = 0.300 * (Q+R)	LLSL								4,000	101,000	46,000 49,000
	Subtotal (T)	_								9,000	209,000	94,000
TOTAL O&M COSTS (LONG-TERM ACTIVITIES) (U = Q+T)	W=0+D									20.000	468.000	211.000
TOTAL CAPITAL COSTS AND TOTAL ORM COSTS (U=11+P+U)	S(U=11+P+U)										201,000,000	164,000,000
A-15.W1 STRUCTURES DAA												07-Jul-93

Cost Estimate - No Future Use, Agent History Medium Group Alternative No. 17: Dismantling Hot Gas. On-Post Hazardous Waste Landfill Table C-26

			Cost	Cost Start	End	1992 (\$)		Volume Mileage	e Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Irem			Type		Year	Unit Cost Units	Quantity Units	Factor Factor	or Factor Description	n Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS											;	;
Apent Monitoring			SJ	-	;	2.29 /CY	72,777 CV		_		000'061	000'061
A nearl Monitoring			15	_	;	2.29 /CY	12,777 CY	1.000	_		190,000	190,000
Une Gas for A sent Christmen			2	_	:	0.81 /SF	2,449,922 SF	1.000	0001 00		2,265,000	2,265,000
A court Monitoring			2	_	:	2.29 /CY	12,777 CY				190,000	190,000
Agent Pleaning			2	-		5.77 /CY	72,777 CY				475,000	475,000
On-post flazardous waste Landfill Closure	Sure		ខ	- 7		3.80 /CY	ייז יויבו	1.000 1.000			316,000	301,000
		Subtotal (A)	€							I	3,626,000	3,611,000
INDIRECT CAPITAL COSTS		COSTCODE	HSS SH									
MobDemob	4.5%	B = 0.045 * (A)									163,000	162,000
Indirects Overhead & Piroff	36068	$C = 0.390 \cdot (A+B)$									1,478,000	1,472,000
Engineering Design	65%	D=0.065 * (A+B+C)									342,000	341,000
Control of the Contro	1.04	E = 0.018 * (A.B.C)									92,000	92000
Contingency	30.0%	F = 0.300 * (A+B+C+D+E)	Ō							-	1,710,000	1,703,000
			ć								3,786,000	3,770,000
		Subtodai (G =B+C+C+E+F)	<u>.</u>							l		
TOTAL CAPITAL COSTS (H = A+G)											7,411,000	7,381,000
												;
A-17,W01												07-Jul-93
STRUCTURES DAA												

Table C-26 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 17. Dismantling. Hot Gas, On-Post Hazardous Waste Landfill

		Cost	1	Fnd	(\$) (\$)		Exp/Red Mileage	Mileage	Other	1995 (\$)	1995 (\$)	1995 (\$)
Cost Item			•	i i	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT OR M COSTS (OPERATIONS)											į	
Agent Monitoring		<b>.</b>	_	7	22.53 /CY	72,777 CV	1.000	000	1.000		1,871,000	1,827,000
Repair of Agent Structures		∢ '	_	7			0001	80.1	00.1		3,430,000	5,374,000
Air Sampling		<	_	7	2,940,789.00 /YR		000.	80.	1.000		15 150 000	4 905 000
Demolition of Agent Structures		∢	_	7			1.000	997			000,802,01	000,000
Loading Hazardous Debris		⋖・		7 ,	1.55 /CY	17,71 CY	0091	8 8	1.000 Expension		000,002	2 97 1 000
Agent Monitoring		< <		<b>،</b> د			091	86.1			71.393.000	69,693,000
Hot Cas for Agent Surdures		< <		٦,			091	9			2 994 000	2,923,000
Agent Monitoring		٠ ٠		۷,			203	8			28 310 000	27 636 000
Debns Sampling, Process/Agent, 1182 Disposal		< <		, r			0091	4,000			269,000	\$55,000
Commence of the control of the contr		: <					0001	000			338,000	330,000
Catalogia of Chandrase Farmanica		< <		٠,			000	1.000	1.000		174,000	170,000
Datasion of Structure Personalism		< ∢		. ~			000.1	0001	1.000		2,000	2,000
NCSIDIATION OF SUBLIDIA CALANDON		ţ										
	Subtotal (f)									ł	134,277,000	131,080,000
INDIRECT ORM COSTS (OPERATIONS)		HMLSST										
2.0%	}										2.686,000	2,622,000
Indirects, Overhead & Profit 39.0% K = Conjugation Decision	K = 0.390*(I+J)										0	0
* 36° C	M = 0.020 * (1+1+K)										3,808,000	3,717,000
31.3%	N = 0.313 * (I+J+K+L+M)										60.683.000	59,238,000
											000 000	200
	Subtotal (O = J+K+L+M+N)										120,592,000	117,721,000
DIRECT OR M COSTS (LONG-TERM ACTIVITIES)  On and Handric Waste Landfill Closure		4		Ş	0.13 CY	12.777 CY	1.000	1.000	1.000	11,000	313,000	163,000
		:		}								
	Subjected (P)								i	11,000	313,000	163,000
INDIRECT O&M COSTS (LONG-TERM ACTIVITIES)	COSTCODE	LLSL							•			;
Indirects, Overhead & Profit 39.0% G = Contingency 30.0% R =	G = 0.390 * (P) R = 0.300 * (P+Q)									4,000 5,000	131,000	68,000
	(S) Republic								1	9,000	253,000	132,000
	(a) manage								ı			
TOTAL OR M COSTS (T = 1+0+P+S). [Note: Total OR M Annual Cost Only Includes Long-Term Activities	Annual Cost Only Include	s Long-Ten	n.Activi	ities						20,000	255,435,000	319,096,000
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (U = H+T)	: H+T).										263,000,000	256,000,000
												0.1 1.4
A-17.WOI												CC-101-10
STRUCTUM'S VAN												

Table C.27 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 18: Dismantling Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill

			Cost Start	•	End	1992(\$)		Volume Mileage	Milcage	Other	1995 (\$)	(\$) \$661	1995 (\$)
Cost Item			Type	Year	Year	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS													
Agent Monitoring			ន	_	;	2.29 /CV	72,77 CY	1.000	00.	1.000		190,000	190,000
Agent Monitoring			ี	-	:	2.29 /CY	TTLT CV	1.000	000	1.000		190,000	190,000
Peroxide/Hypochlorite			ನ	-	;	175.22 /CY	3,372 CV	1.000	1.000	1.000		674,000	674,000
Acent Memitoring			SI	_	;	2.29 /CY	72,77 CY	1.000	1.000	1.000		190,000	190,000
On-rost Hazardous Waste Landfill			2	_	;	5.72 /CY	12,777 CY	1.000	1.000	1.000		475,000	475,000
On-post Hazardous Waste Landfill Closure	losure		ន	7	:	3.80 /CY	12.777 CV	1.000	1.000	1.000		316,000	301,000
		Subtotal (A)	æ									2,036,000	2,020,000
INDIRECT CAPITAL COSTS MAcDemob Indirects, Overhead & Profit Engineeting Design	3.9% 39.0% 4.5%	COST CODE B = 0.039*(A) C = 0.390*(A+B) D = 0.045*(A+B+C)	LMSS									79,000 825,000 132,000	78,000 819,000 131,000
Resident Engineering	1.5%											44,000	44,000
Contingency	27.5%		ė									857,000	820,000
		Subtotal (G =B+C+D+E+F)	Ē									1,937,000	1,922,000
TOTAL CAPITAL COSTS (H = A+G)												3,972,000	3,943,000
A-18.WQ1													07-Jul-93

A-18.WQI STRUCTURES DAA

Table C.27 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 18: Dismantling, Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill

		Cost Start	rt End	وا	1992 (\$)		Exp/Red Mileage	Milcage	Other	(\$) 5661	(\$) 5661	1995 (\$)
Cost Item			ar Year		Unit Cost Units	Ouantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT O&M COSTS (OPERATIONS)												
Agent Monitoring		∢	1 2	7	22.53 /CY	72,77 CV	000:1	000.	1.000		1,8/1,000	1,827,000
Repair of Agent Structures		<	7		5.28 /CY	3/3,624 CI	0001	200.	1.000		000,000,000	00011515
Air Sampling		<	1 2				1.000	3	00.1		0,712,000	000,000
Demolition of Agent Structures		∢	1 2	7			1.000	00.1			200,000	14,693,000
Loading Hazardous Debris		⋖ ·	1 2	7 7	1.55 /CY	72,777 CY	009.1	8	1.000 Expansion		2 991 000	2 973 000
Agent Monitoring		< •	7 .	<b>,</b> ,			691	8			674.000	658.000
Peroxide/Hypochiorite		< ⋅		7 (			8	8			3 991 000	7 07 1 DM
Agent Monitoring		<	1 2	7			0007	99.			30,774,000	31 636 000
Debris Sampling, Process/Agent, Haz Disposal		∢	1 2	2			009.	000.	1.000 Expansion		000,018,82	000,000,7
Transportation of Hazardous Waste On-post		<	1 2	2			1.600	7000	1.000 Expansion, Miles		000,600	000,000
On-post Hazardous Waste Landfill	-	4	1 2	2	4.07 /CY		1.000	1.000	1.000		338,000	330,000
Backfill of Smeture Excavation		<	1 2	7	8.05 /CY	18,978 CY	1.000	1.000	1.000		174,000	170,000
Restoration of Structure Excavation		<	1 2	2	0.08 /SF	18.978 CY	1.000	1.000	1.000		2,000	2,000
									٠.			
	Subtotal (I)									1	63,558,000	62,045,000
INDIRECT O&M COSTS (OPERATIONS)	COSTCODE	HMLSST										
2.0%	J = 0.020 * (I)										1,271,000	1,241,000
& Profit 39.0%	K = 0.390 * (I+J)										25,284,000	74,682,000
960:0	L = 0.000 * (I+J+K)										1 807 000	1 759 000
Resident Engineering 2.0% M	M = 0.020 * (I+J+K) N = 0.313 * // 1.4K./ 1.88										28,724,000	28,040,000
	Subtotal (O = J+K+L+M+N)	_								J	57,080,000	55,721,000
DIRECT ORM COSTS (LONG-TERM ACTIVITIES) On coort Hazardone Waste Landfill Choure		<	. 6	0	0.13 ·CY	12.777 CY	1.000	1.000	1.000	11,000	313,000	163,000
										000 11	313.000	163,000
CONTACTOR MOTH CASO & STOCK MONTH CONTRACTOR	SUGGISTAL (F)	101										
	Q = 0.390 * (P)	ופון								4,000	122,000	64,000
Contingency 30.0% R=	R = 0.300 * (P+C)									2,000	000,161	Con'non
	Subtotal (S)								ı	000'6	253,000	132,000
			3							20.000	121,205,000	118 062 000
TOTAL OR M COSTS (1 = 1+0+P+S)   Note: 1 dat OR M Annual Cost Univ includes Long 1 cm Activities	Annual Cost Only Includ	rs Long- I'en	m Achrit	ılıcs						000		
TOTAL CAPITAL COSTS AND TOTAL OR M COSTS (U = 11+T)	= H+T)										125,000,000	122,000,000
												0.7 1.4 0.3
A-18.WQ1												CK-Int-/O

A-18.WQI STRUCTURES DAA

Table C-28 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 18A: Sand Blasting. Dismanling. Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill

		Cost Start	ı	End	1992 (\$)		Volume Mileage	Mileage	Other	1995 (\$)	(\$) \$661	1995 (\$)
Cost Item		Type Year		je.	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	Total Cost	PW Cost
DIRECT CAPITAL COSTS												
Apent Monitoring		2	-	;			000.1	1.000	1.000		190,000	190,000
Sand Blasting		S	_	:			1.000	1.00	1.000		155,000	155,000
Access Monitoring		S	_	:			1.000	1.000	1.000		190,000	190,000
December of the control of the contr		2	-	;			0001	1.000	1.000		674,000	674,000
recordently which is		3 2					1 000	0001	0001		190,000	190,000
Agent Montioning On about Haverdone Wester Landfill		3 2		: :		72,777 CY	1.000	00.1	1.000		475,000	475,000
On-root Hazardous Waste Landfill Closure		ន	. 7	;	3.80 /CY	72,777 CY	1.000	1.000	1.000		316,000	301,000
	Subtotal (A)	₹									2,191,000	2,176,000
L COOSTS	COSTCODE	LMSS									85,000	84,000
											888,000	881,000
											142,000	141,000
Engineering Design	4.5% (J+0+C) (J+0+C)										17,000	47,000
		Φ									922,000	916,000
•		ĵ.									000	000 010 6
	Subtotal (G =B+C+D+E+F)	Ē.								1	2,084,000	70/0/00
TOTAL CAPITAL COSTS (H = A+G)											4,275,000	4,246,000
												1

A-18A,WOI STRUCTURES DAA

07-Jul-93

Table C-28 Cost Estimate - No Future Use, Agent History Medium Group
Alternative No. 18A: Sand Blasting. Dismantling. Peroxide/Hypochlorite, On-Post Hazardous Waste Landfill

				٦	1992(\$)		Exp/Red Mileage	Mileage	Other	(\$) \$661	1995 (\$)	1995 (\$)
Cost Item		Type Year	ar Year	ar	Unit Cost Units	Quantity Units	Factor	Factor	Factor Description	Annual Cost	lotal Cost	rw Cost
DIRECT O&M COSTS (OPERATIONS)												
Agent Monitoring		∢	_	7	22.53 /CY	72,777 CY	1.000	00	1.000		1,871,000	1,827,000
Repair of Agent Structures		∢	_				000	000	000.1		3,430,000	3,3/4,000
Air Sampling		۷	_	7	2,9.10,789.00 /YR	2 YR	1.000	8 -	1.000		6,712,000	6,552,000
Sand Blasting		<	_	2			1.000	1.000	1.000		1,124,000	1,097,000
Agent Monitoring		∢	_	7	22.53 /CY		1.000	000	1.000		1,871,000	1.827,000
Demolition of Agent Structures		<	_	7			1.000	00.			15,259,000	14,895,000
Loading Hazardous Debris		4	_	2	1.55 /CV	72,777 CY	1.600	1.000	1.000 Expansion		206,000	201.000
Peroxide/Hymochlorite		<	_	7	109.40 /CY	3,372 CV	1.600	1.000	1.000 Expansion		674,000	658,000
Agent Menitoring		<	_	2	22.53 /CY	72.777 CY	1.600	000.	1.000 Expansion		2,994,000	2,923,000
Debris Samuling, Process/Agent, Haz Dispusal		: <		7			1.600	1.000			28,310,000	27,636,000
Transaction of Handedone Waste On prost		4	_	,	AJ/ 201	Y) 777 CY	1,600	4.000	1 000 Expansion Miles		269,000	555,000
transportation of Hazardous waste On-post		< <		۱,			0001	9			118,000	130,000
Un-post riazardous waste Landill		٠ ،		٠,			900:1	2	000		000121	170,000
Backfill of Structure Excavation		∢ ·		7 (		13,978	000.	99	000:1		90,	000
Restoration of Structure Excavation		<	_	7	0.08 (SF	18,978	1.000	30.	000:1		7,000	7007
	Subtotal (f)									i	63,560,000	62,046,000
INDIRECT ORM COSTS (OPERATIONS)		HMISST										
2.0%											1,271,000	1,241,000
& Profit 39.0%	K = 0.390 * (I+J)										25.284,000	24,682,000
<b>4</b> 000	L = 0.000 " (14.0+K)										1 802 000	1 759 000
Hesident Engineering 2.0%	M = 0.020 " ((+.)+K) N = 0.020 " ((+.)+K)										28,724,000	28,040,000
8	יייייי (יייטדוארביוויי)											
	Subtotal (O = J+K+L+M+N)	_								ŀ	57,082,000	55,723.000
DIRECT OR M COSTS (LONG-TERM ACTIVITIES)												
On-post Hazardous Waste Landfill Closure		<b>V</b>	×	30	0.13 °CY	72 TT CY	0001	0001	1.000	11,000	313,000	163,000
	Subtotal (P)									11,000	313,000	163.000
INDIRECT O&M COSTS (LONG-TERIM ACTIVITIES)	COSTCODE	LISE										
erhead & Profit 39.0%	Q = 0.390 * (P)									4,000	122,000	64,000
Contingency 30,0% I	H = 0.300 * (P+Q)									0000	131,000	00000
	Subtotal (S)								•	000'6	253,000	132,000
THE PARTY OF THE P		F		7						000 00	171 707 000	118 064 000
TOTAL OR M COSTS (T = 1+0+P+5). INote: Total OR M Annual Cest Univ. Includes Leng-Term Activities.	M Annual Cost Only, Include	s cmg- lcm	1 Activi	Thrs						NAMA.	No. Company	- 1 Sec. 1997
TOTAL CAPITAL COSTS AND TOTAL O&M COSTS (U = 11+T)	(U = 18+T)							1			125,000,000	122,000,000
A-18A.WQ1												07-Jul-93
STRUCTURES DAA												

TABLE C4.0-1 MARKUP MATRIX C:\RMAFS\BACKUP\MAMUTRX.WQ1 08-Jul-93

CAPITAL COST

CAPITAL COST							
CONSIDERATION	LEVEL	EXAMPLES	MOB/	INDIRECTS	DESIGN	RESIDENT	CNTGNCY
FACTORS			DEMOB	O&P	ENGR	ENGR	
		Level D or no protection					
	Low	Up to 10% Level C	2.00%	34.00%		1.00%	25.00%
		No Level A or B					
		From 10% to 25% Level C					
CONTAMINATION	Medium	No Level A or B	4.50%	39.00%		2.00%	30.00%
		26% or greater Level C					
	High	Level A or B	7.00%	44.00%		3.00%	40.00%
		Excavation, backfill, transportation,					
	Low	normal civil/structural construction	2.00%	39.00%	3.00%	1.00%	25.00%
		Vapor Extraction, Landilli					
		Deficient, Proven Decort Metrods, Furth &	/800	800 00	/0021		,800 Oc
TECHNOLOGY	Medium	& Ireat Facilities, Mech & Elect Const, UXU D&U Solidification	4.50%	39.00%	4.00% 8	Z.00%	30.00%
		Incineration, Thermal Desorption					
	High	in-Situ Vitrification, Unproven Decon Methods	7.00%	39.00%	6.50%	3.00%	40.00%
	Small	Less than 20 Craft personnel	4.50%	44.00%		2.00%	30.00%
JOB SIZE	Medium	20 to 60 Craft personnel	4.50%	39.00%		2.00%	30.00%
	Large	More than 60 Craft personnel	4.50%	34.00%		2.00%	30.00%
	Short	< 3 Years	4.50%	39.00%		1.00%	25.00%
DURATION	Medium	3 to 7 Years	4.50%	39.00%		2.00%	30.00%
	Long	> 7 Years	4.50%	39.00%		3.00%	40.00%

TABLE C4.0-1 MARKUP MATRIX C:\RMAFS\BACKUP\MAMUTRX.WQ1 08-Jul-93

# O&M COST

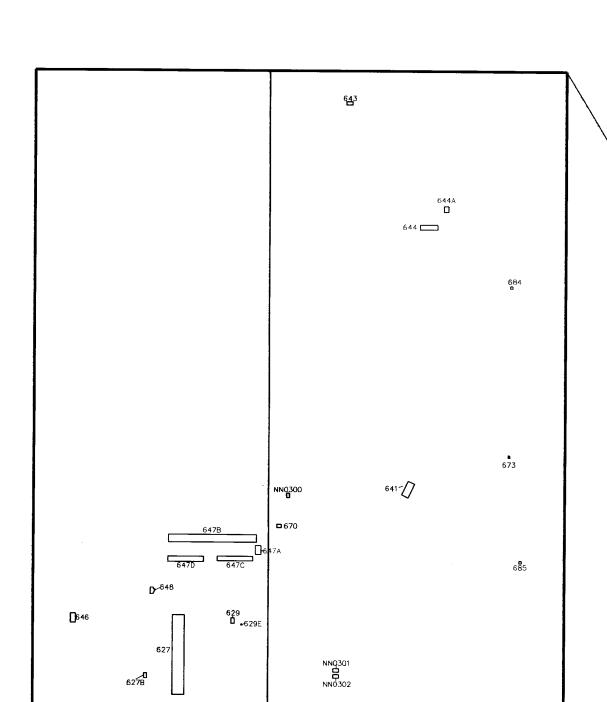
CAIN COST							
CONSIDERATION	LEVEL	EXAMPLES	/BOW	INDIRECTS	DESIGN	RESIDENT	CNTGNCY
FACTORS			DEMOB	O&P	ENGR	ENGR	
		Level D or no protection					
-	Low	Up to 10% Level C	2.00%	34.00%		1.00%	25.00%
		No Level A or B					
		From 10% to 25% Level C					
CONTAMINATION	Medium	No Level A or B	4.50%	39.00%		2.00%	30.00%
		26% or greater Level C					
	High	Level A or B	%00°L	44.00%		3.00%	40.00%
		Excavation, backfill, transportation,					
	Low	normal civil/structural construction	2.00%	39.00%	0.00%	1.00%	25.00%
		Vapor Extraction, Landfill					
		Demolition, Proven Decon Methods, Pump &					
TECHNOLOGY	Medium	& Treat Facilities, Mech & Elect Const, UXO D&D	4.50%	39.00%	1.00%	2.00%	30.00%
		Solidification					
		Incineration, Thermal Desorption					
	High	In-Situ Vitrification, Unproven Decon Methods	7.00%	39.00%	2.00%	3.00%	40.00%
	Small	Less than 20 Craft personnel	4.50%	44.00%		2.00%	30.00%
			ì	300		300	1000
JOB SIZE	Medium	20 to 60 Craft personnel	4.50%	39.00%	•	2.00%	30.00%
	Large	More than 60 Craft personnel	4.50%	34.00%		2.00%	30.00%
	Short	< 3 Years	4.50%	39.00%		1.00%	25.00%
DURATION	Medium	3 to 7 Years	4.50%	39.00%		2.00%	30.00%
	Long	> 7 Years	4.50%	39.00%		3.00%	40.00%

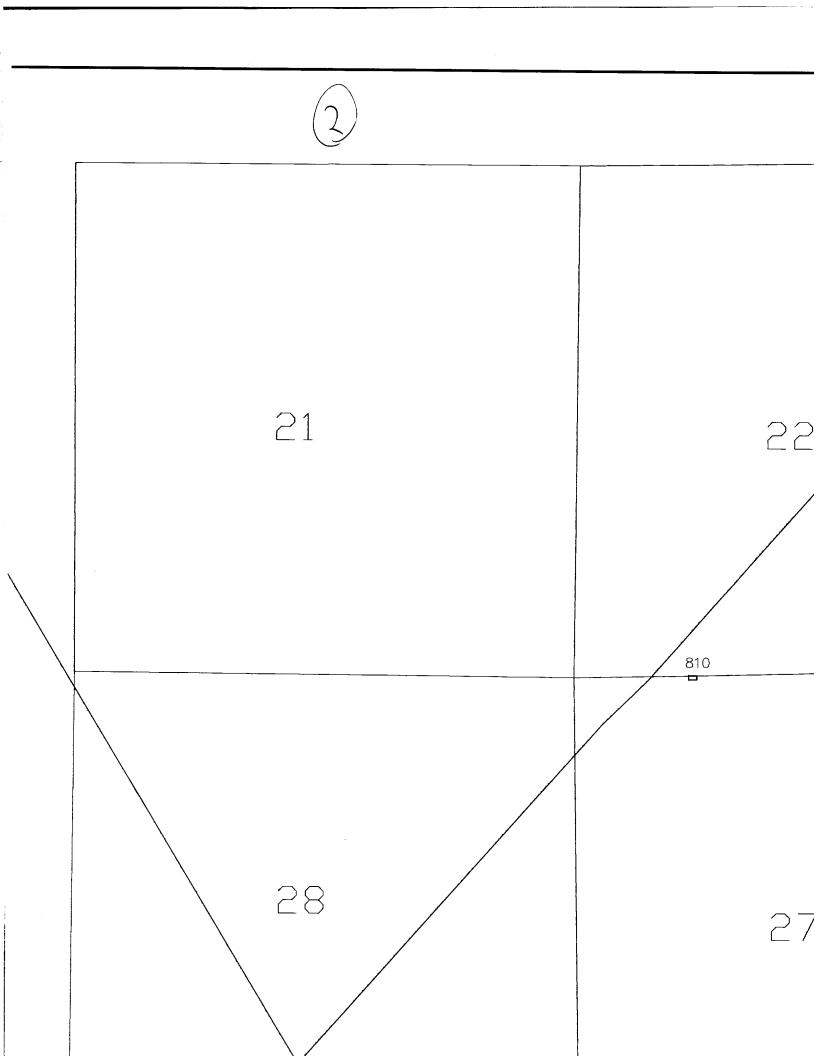
TABLE C4.0-1 MARKUP MATRIX C:\RMAFS\BACKUP\MAMUTRX.WQ1 08-Jul-93

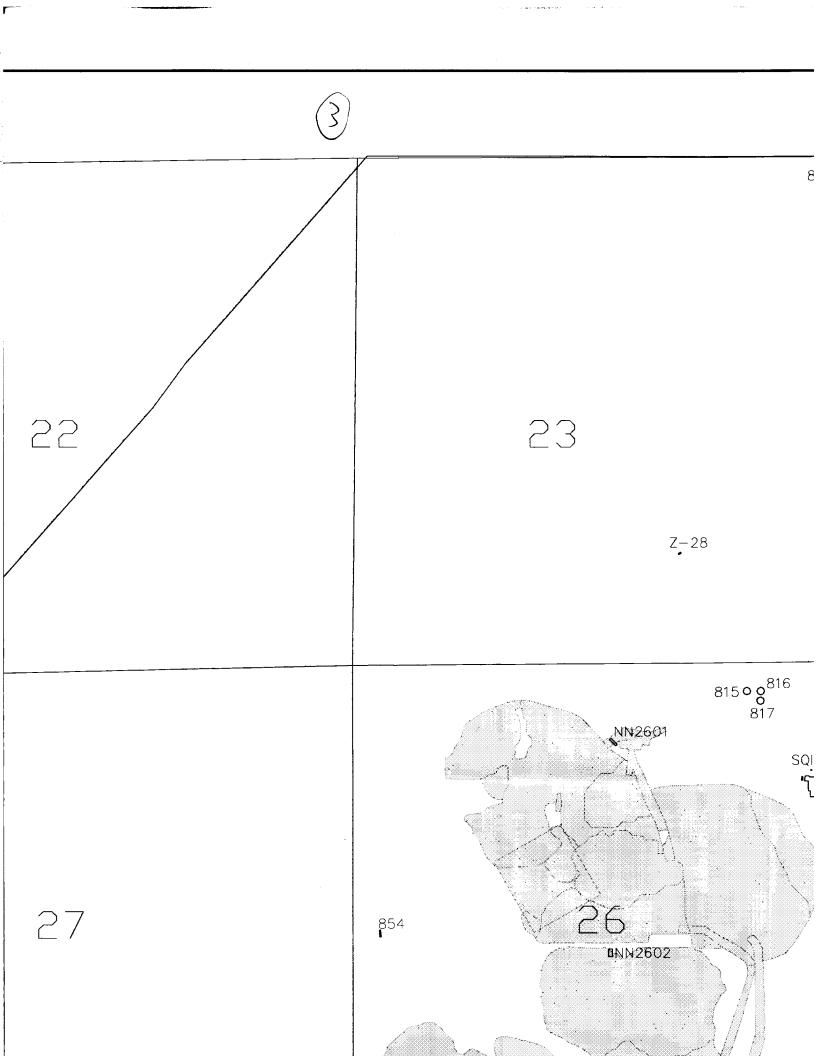
LONG TERM COST

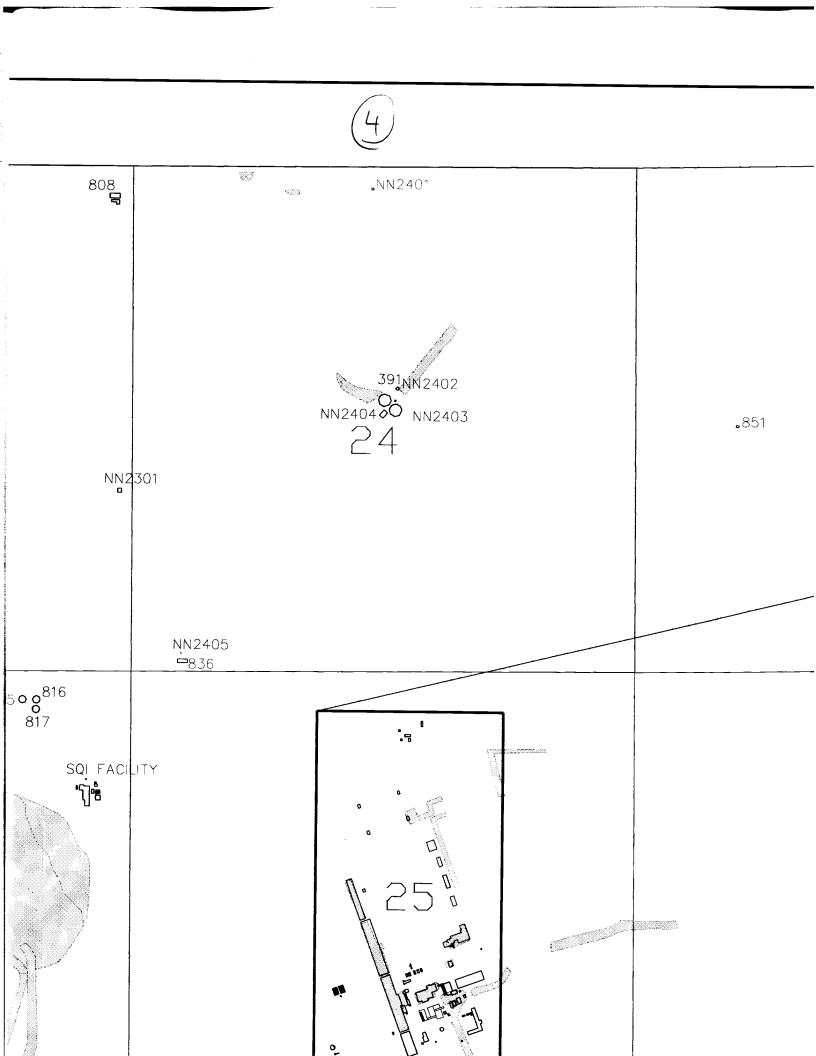
	į	OT ISLANCE	STOTOLOIM	CALTONIO
CONSIDERATION	LEVEL	EAAMPLES	O&P	
	Low	Level D or no protection Up to 10% Level C No Level A or B	34.00%	25.00%
CONTAMINATION	Medium	From 10% to 25% Level C No Level A or B	39.00%	30.00%
	High	26% or greater Level C Level A or B	44.00%	40.00%
	Low	Fencing, Cap Repair, Erosion Control Soil Monitoring, Leachate Collection	39.00%	25.00%
TECHNOLOGY	Medium	None	39.00%	30.00%
	High	None	39.00%	40.00%
	Small	Less than 20 Craft personnel	44.00%	30.00%
JOB SIZE	Medium	20 to 60 Craft personnel	39.00%	30.00%
	Large	More than 60 Craft personnel	34.00%	30.00%
	Short	< 3 Years	39.00%	25.00%
DURATION	Medium	3 to 7 Years	39.00%	30.00%
	Long	> 7 Years	39.00%	40.00%

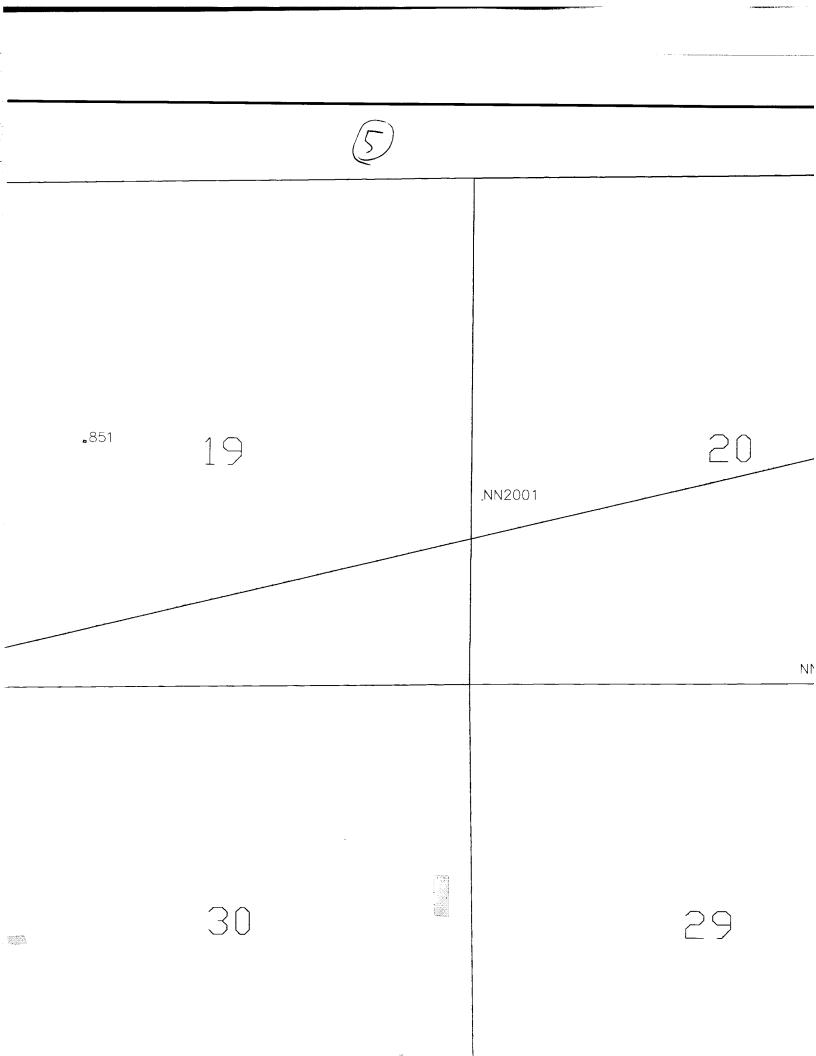


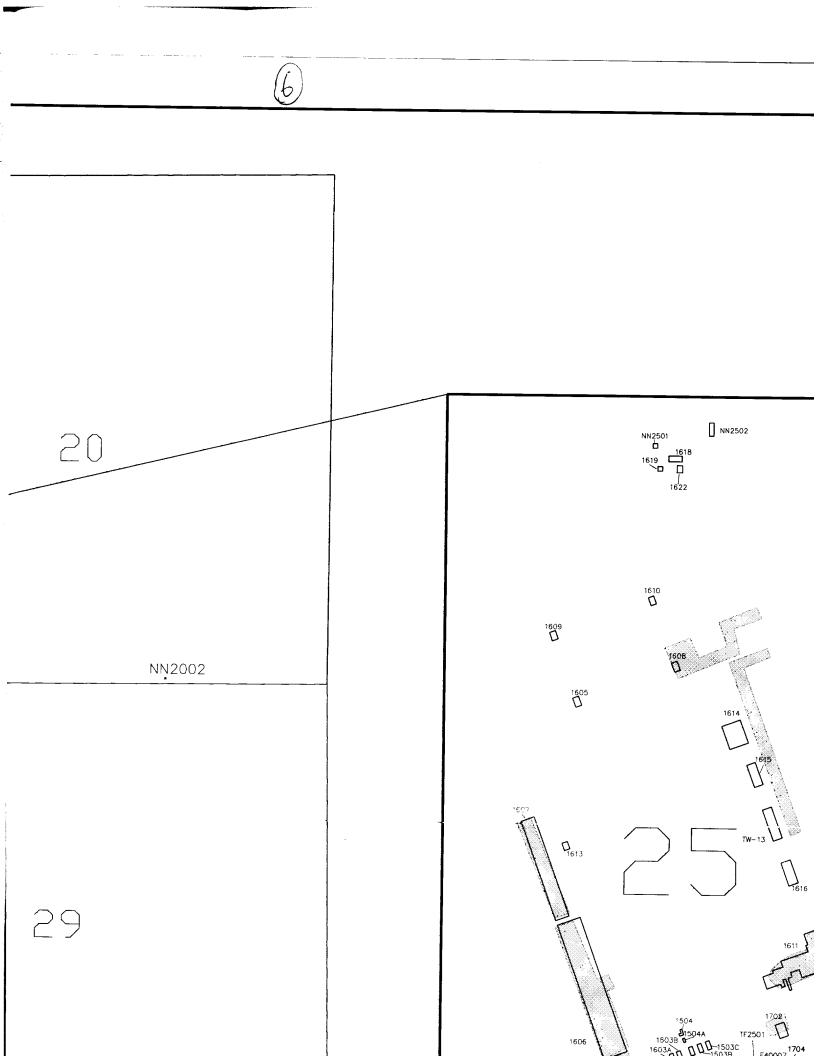


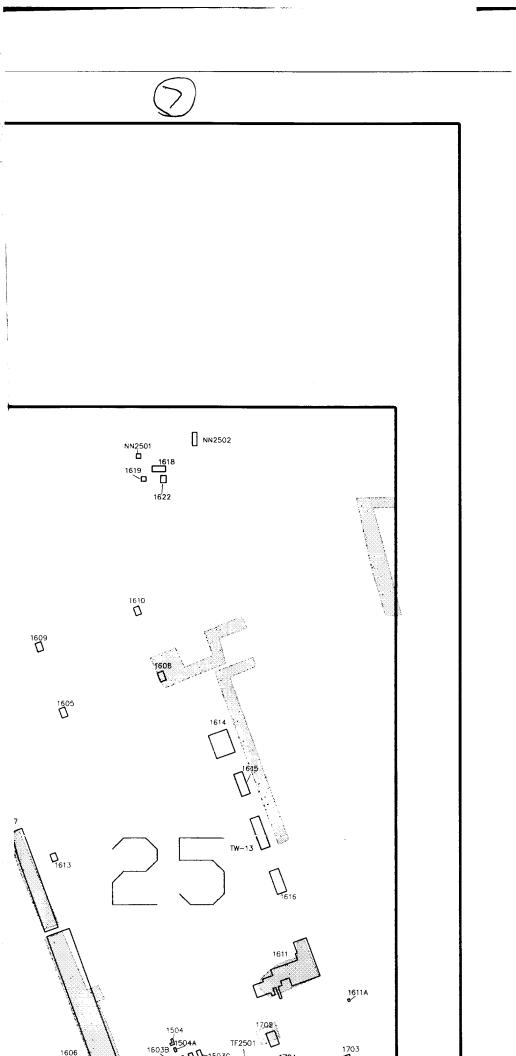


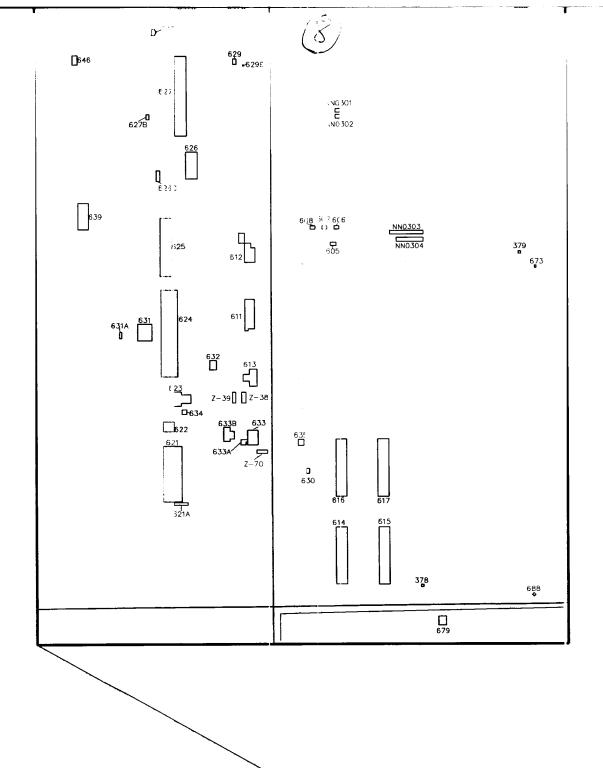






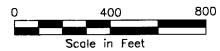


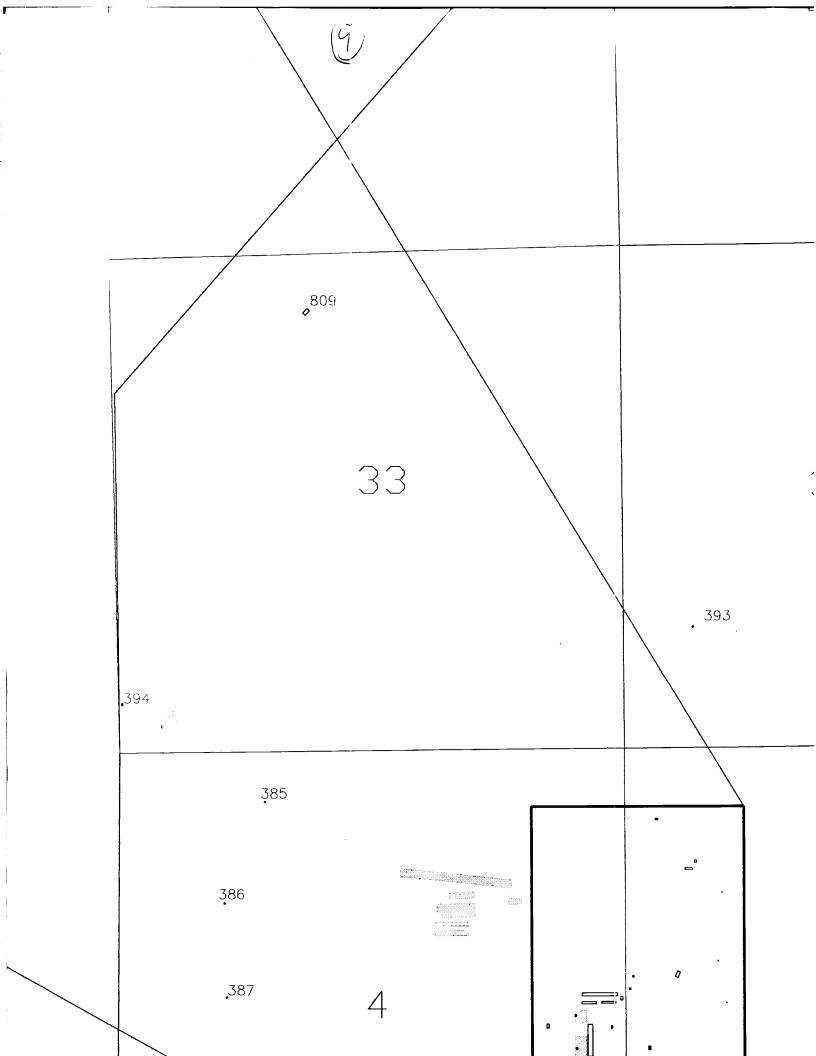


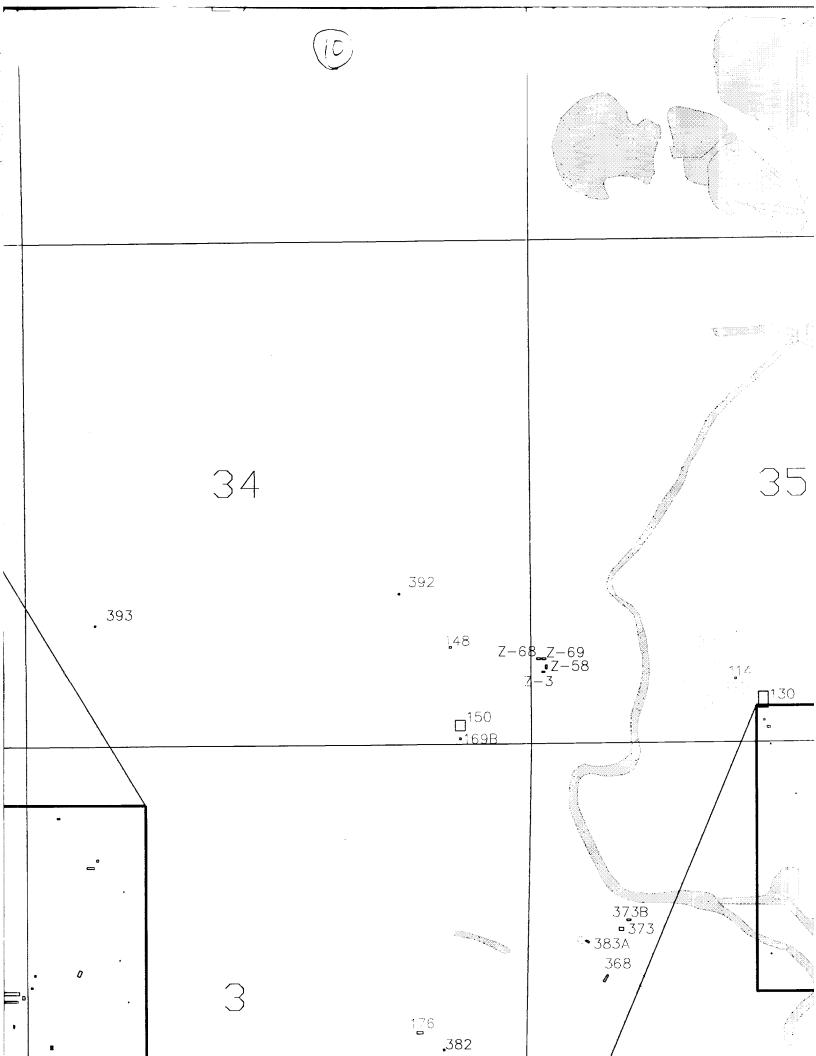


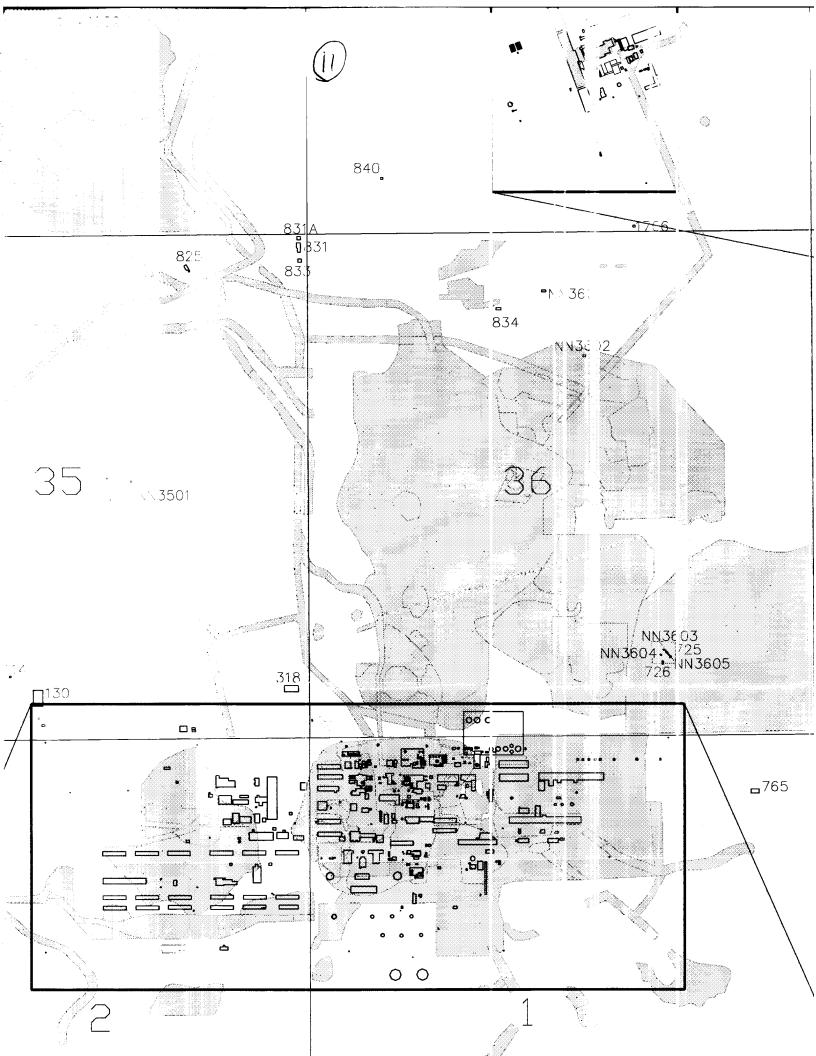
RAIL CLASSIFICATION/ MAINTENANCE YARD

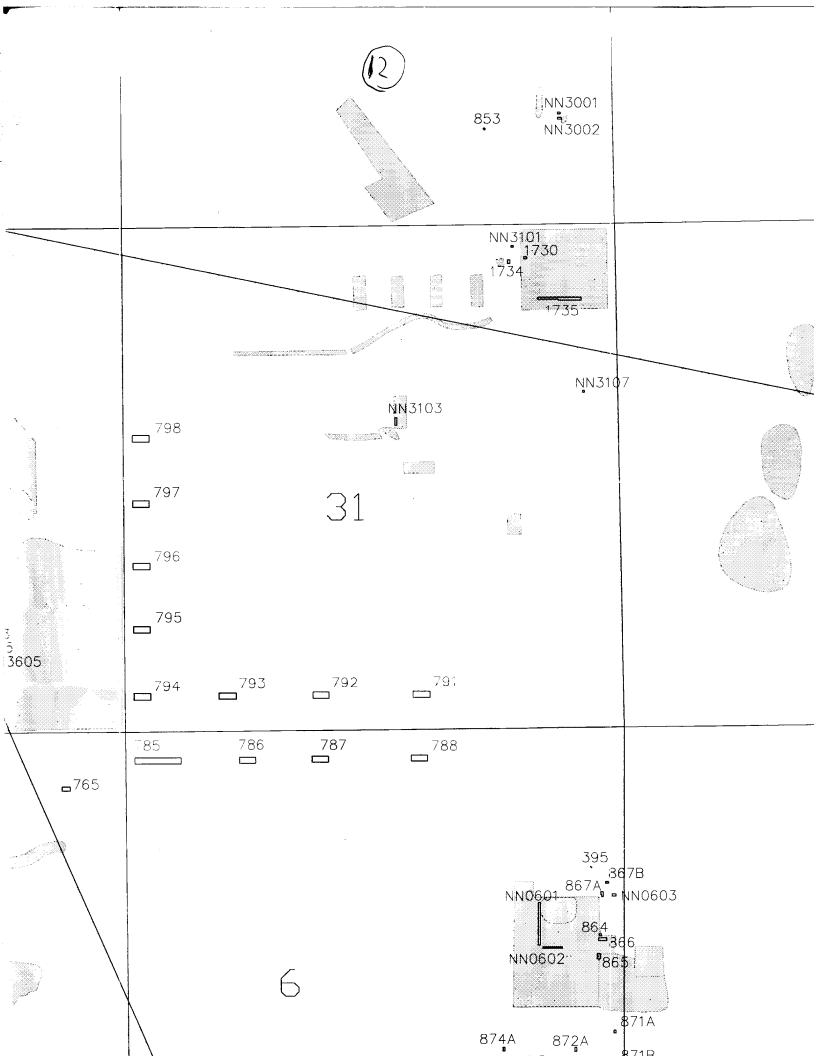
SCALE OF INSERTS:

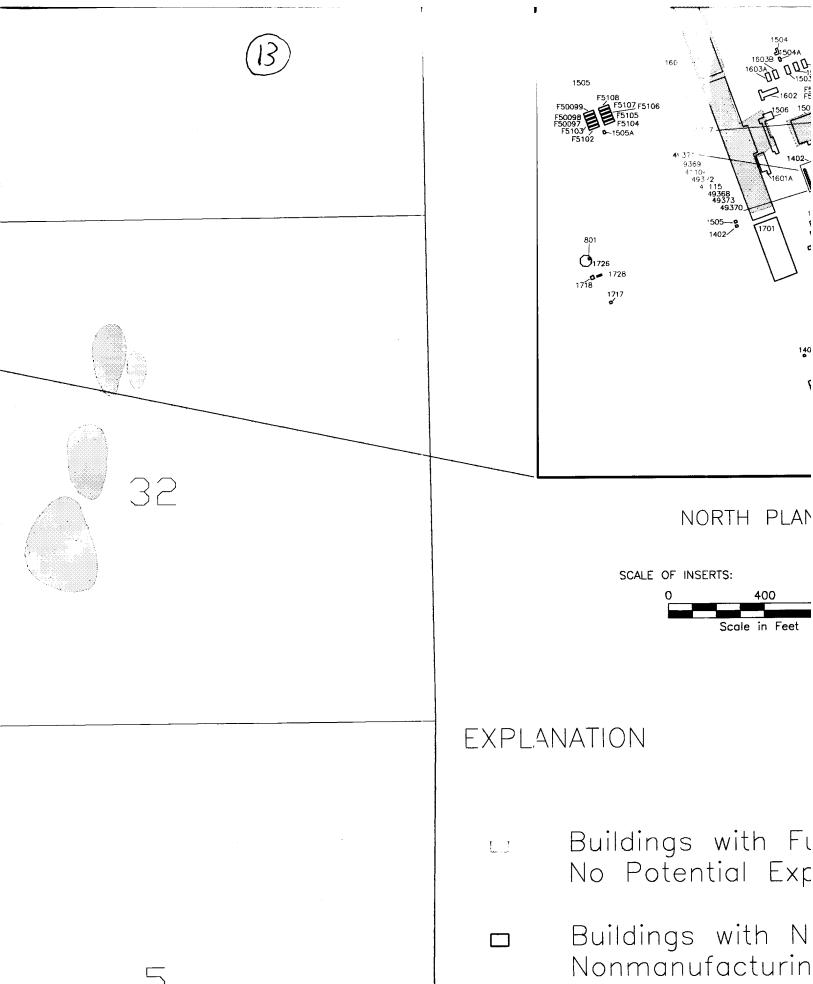








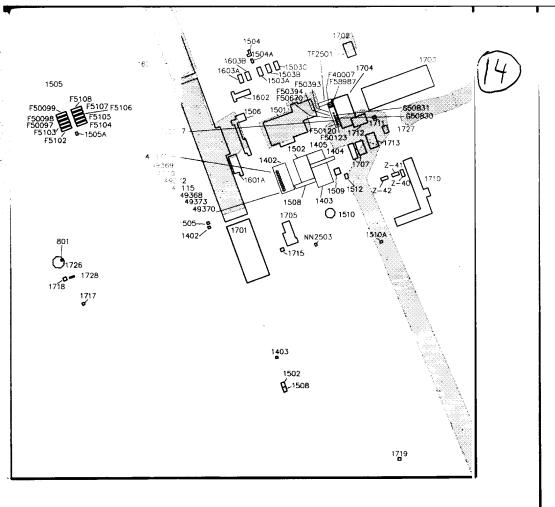




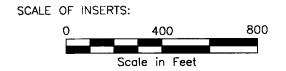
Buildings with N

Manufacturina H

5



#### NORTH PLANTS



## ANATION

Buildings with Future Use No Potential Exposure Problems

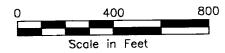
Buildings with No Future Use, Nonmanufacturing History

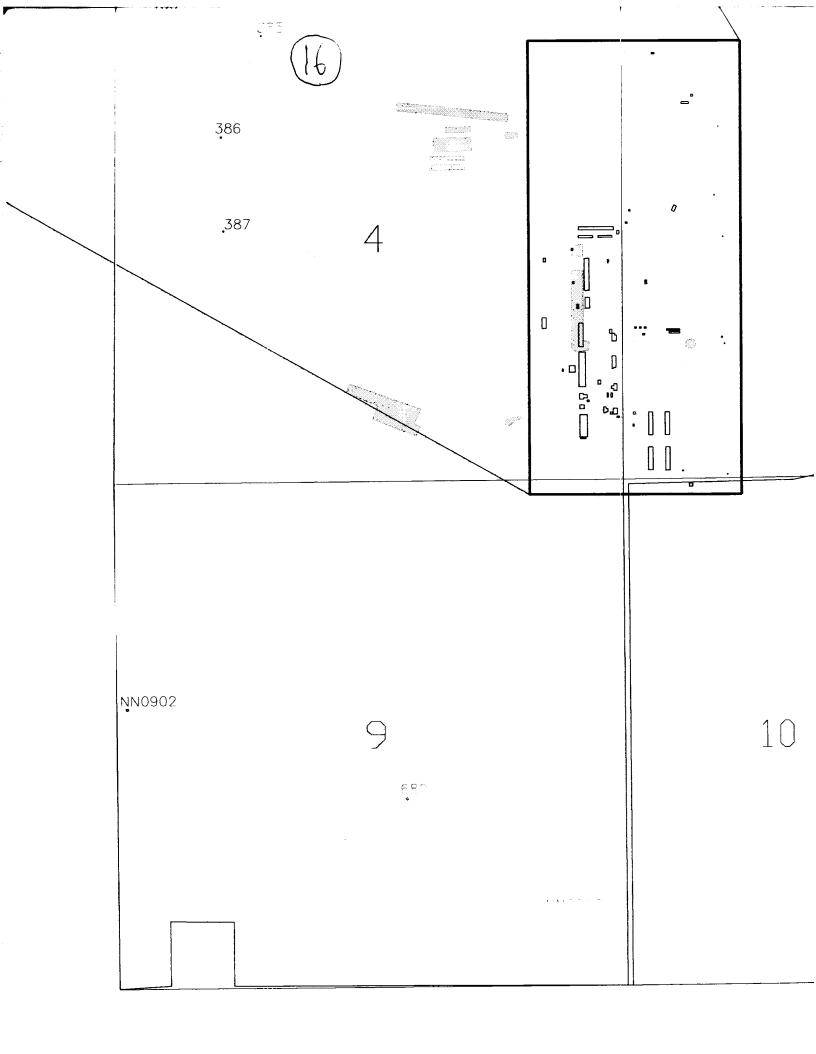
Buildings with No Future Use, Manufacturina History

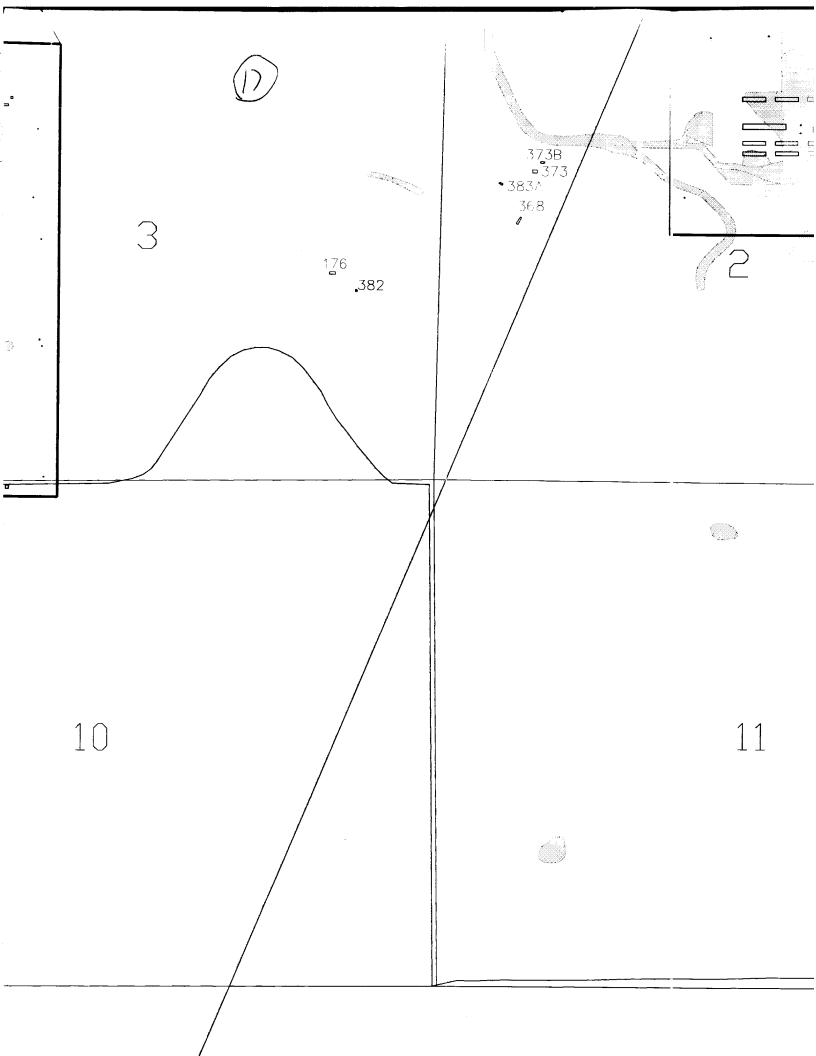


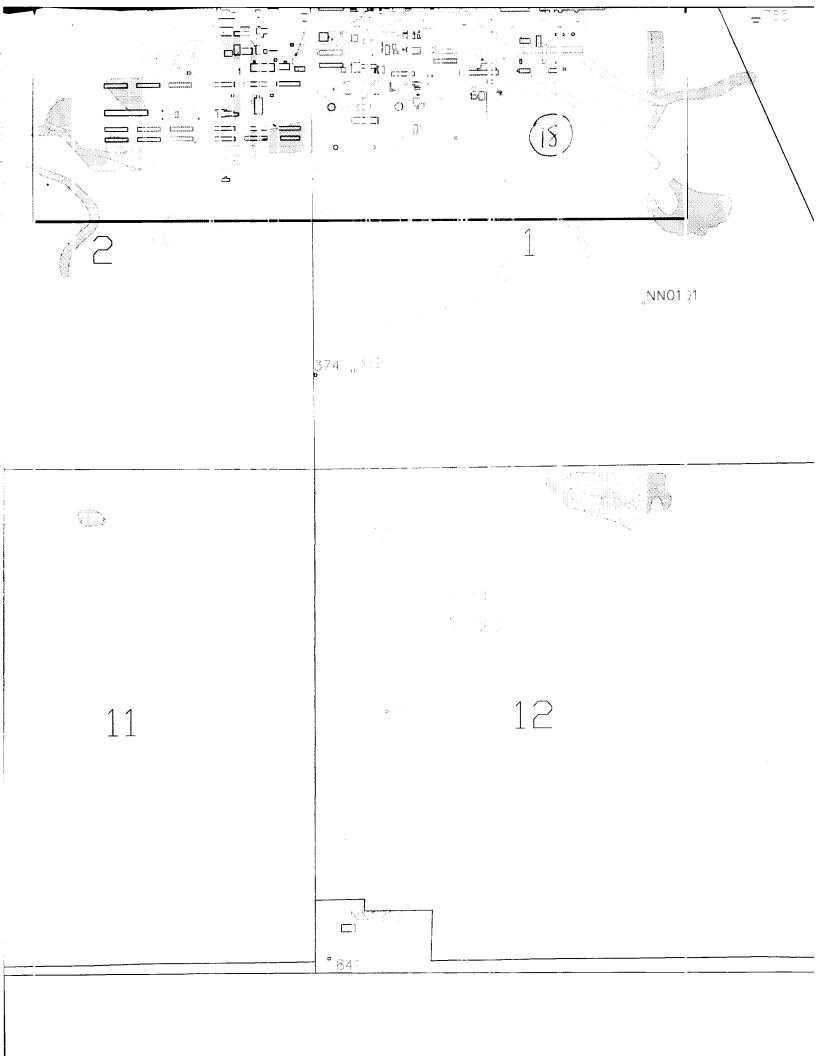
### RAIL CLASSIFICATION/ MAINTENANCE YARD

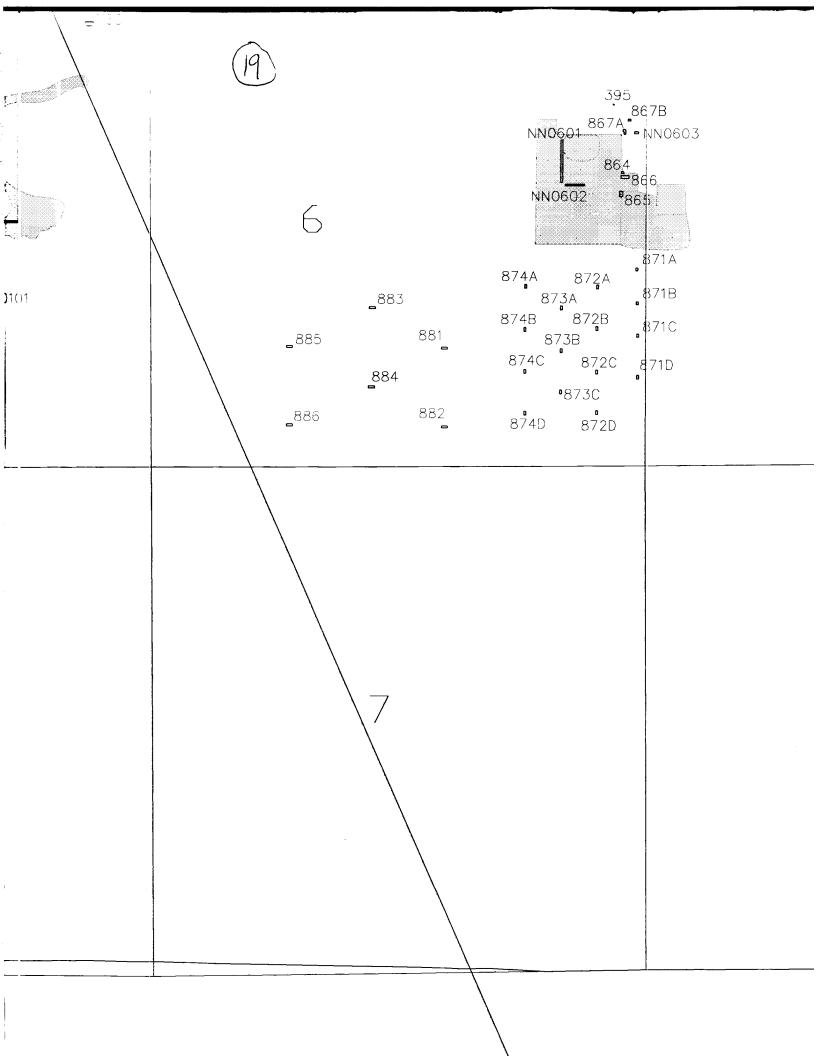
SCALE OF INSERTS:

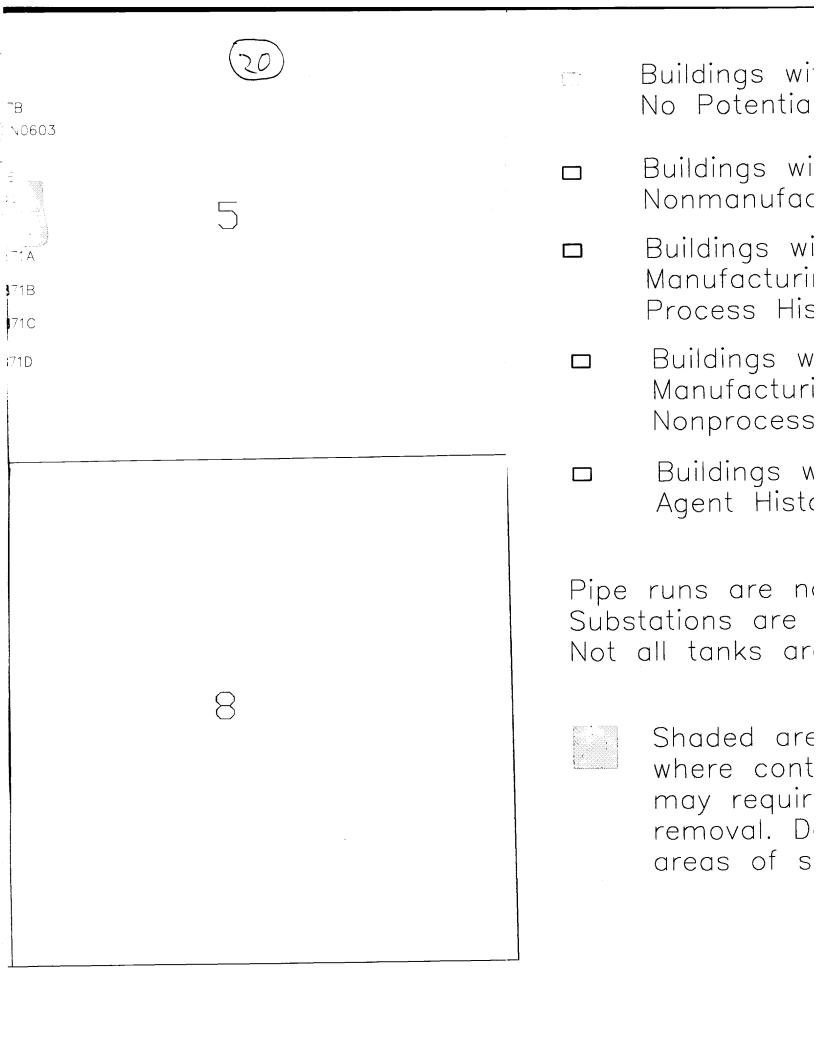












Buildings with Future Use No Potential Exposure Problems

Buildings with No Future Use, Nonmanufacturing History

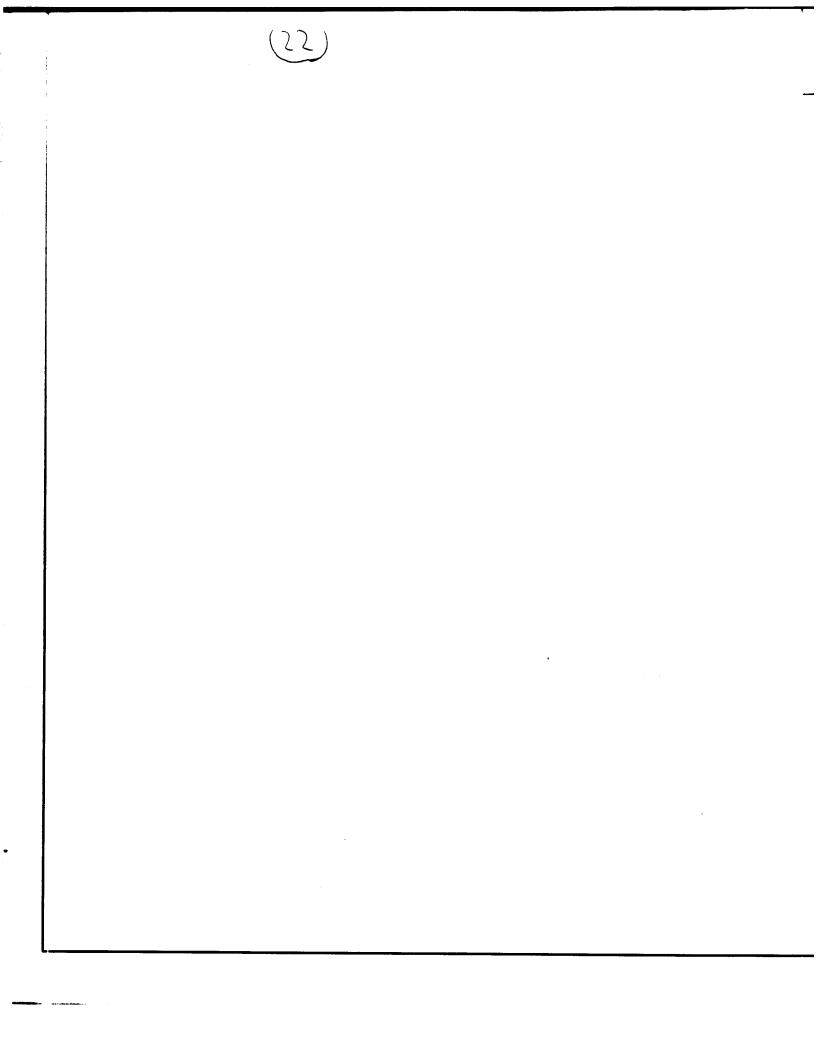
Buildings with No Future Use, Manufacturing History Process History Subgroup

Buildings with No Future Use, Manufacturing History Nonprocess History Subgroup

Buildings with No Future Use, Agent History

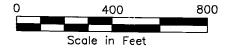
eruns are not shown on map estations are not shown on map all tanks are shown on map

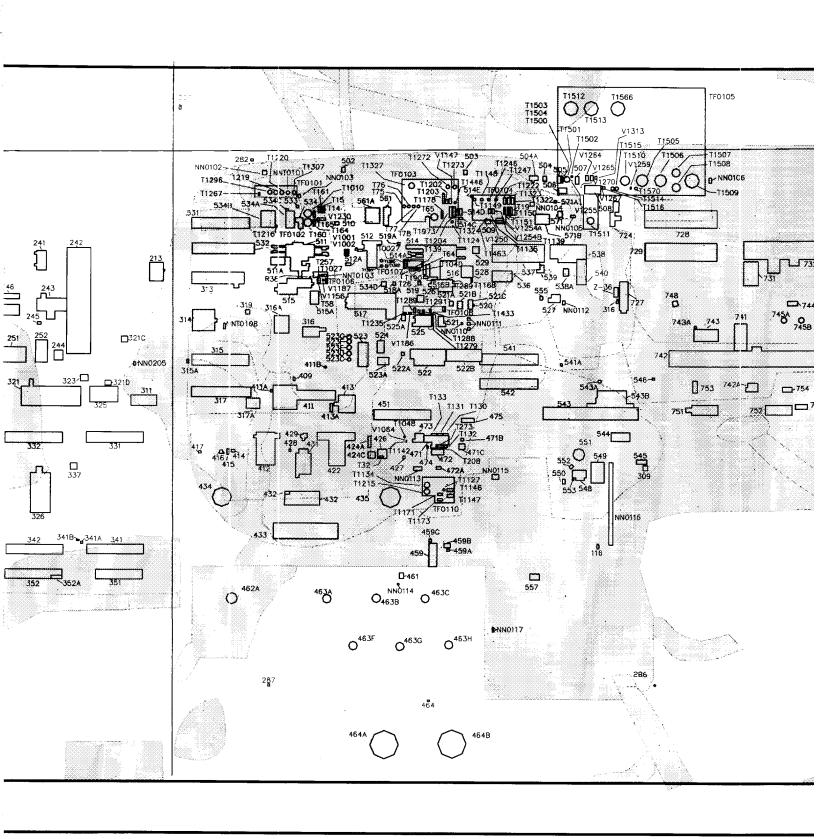
Shaded areas indicate sites where contaminated soil may require structure removal. Does not represent all areas of soil contamination.



## SOUTH PLANTS

SCALE OF INSERTS:





SCALE OF BASE MAP



Prepared for:

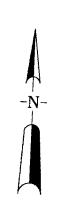
U.S. Army Program Manager for Rocky Mountain Arsenal

Prepared July 1993

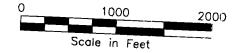
PLATE 1.1-1 Struc

Rocky Mountain Arsenal Prepared by: Ebasco Services out onteminetion





#### SCALE OF BASE MAP:



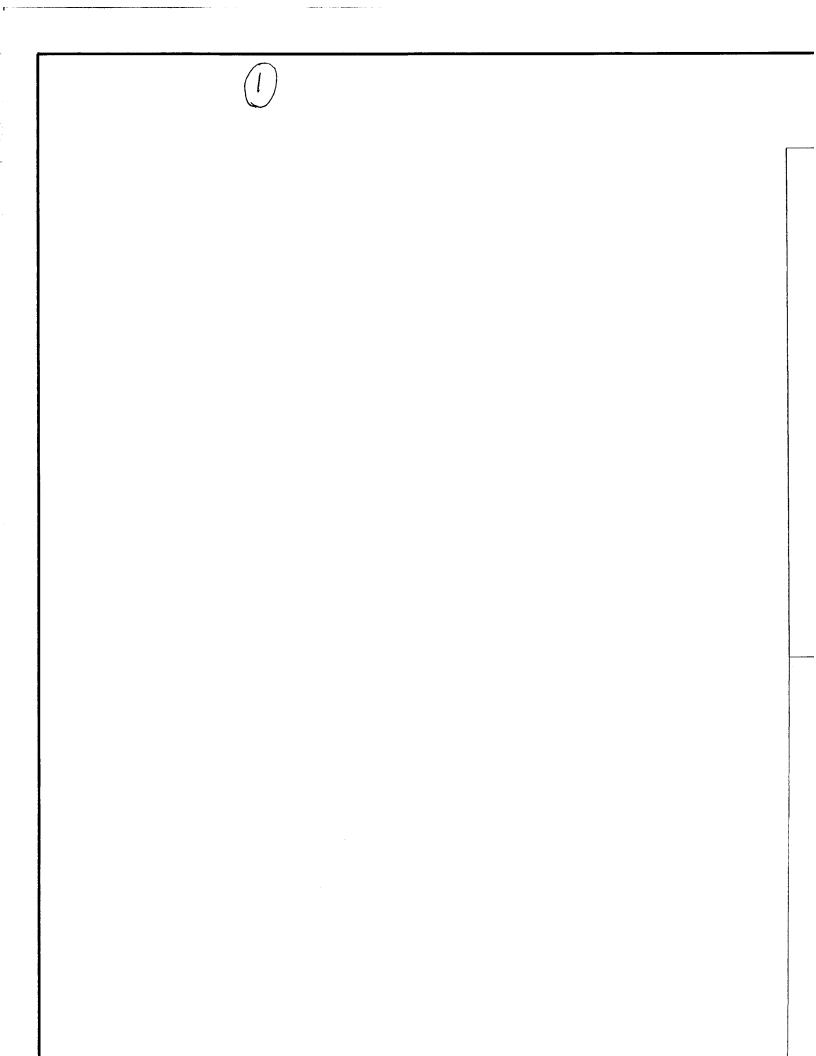
Prepared for:

U.S. Army Program Manager for Rocky Mountain Arsenal

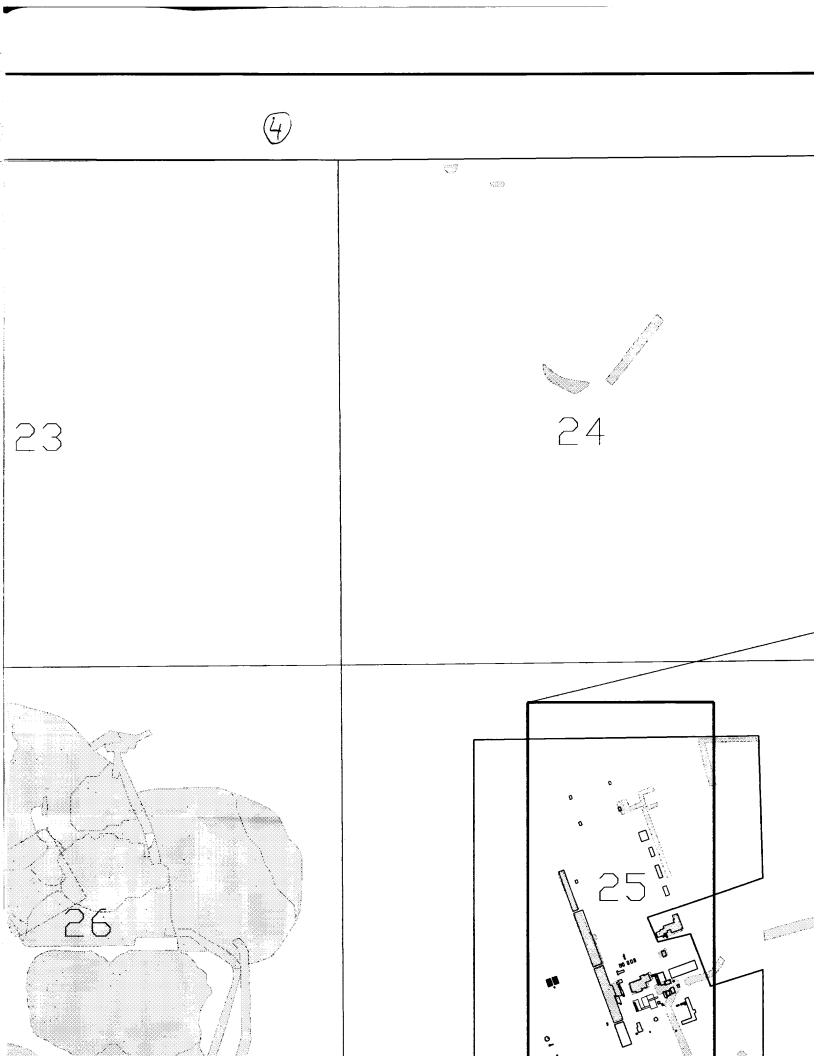
Prepared July 1993

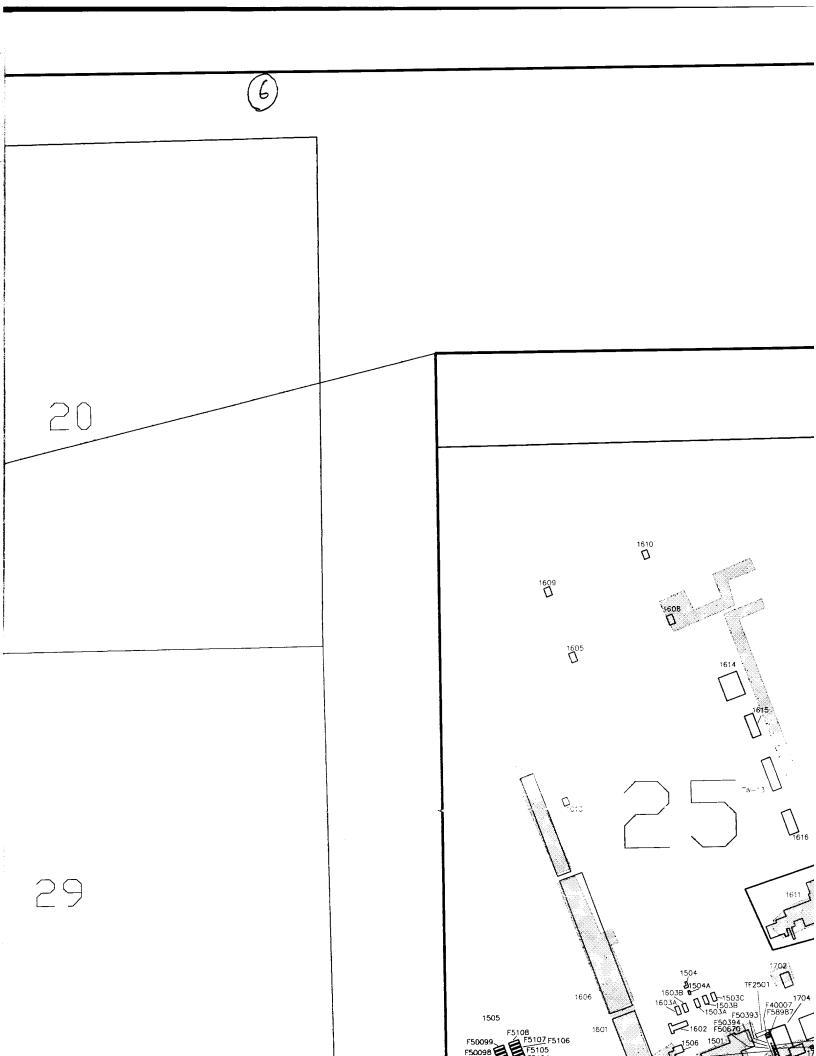
PLATE 1.1-1 Structure Medium Groups

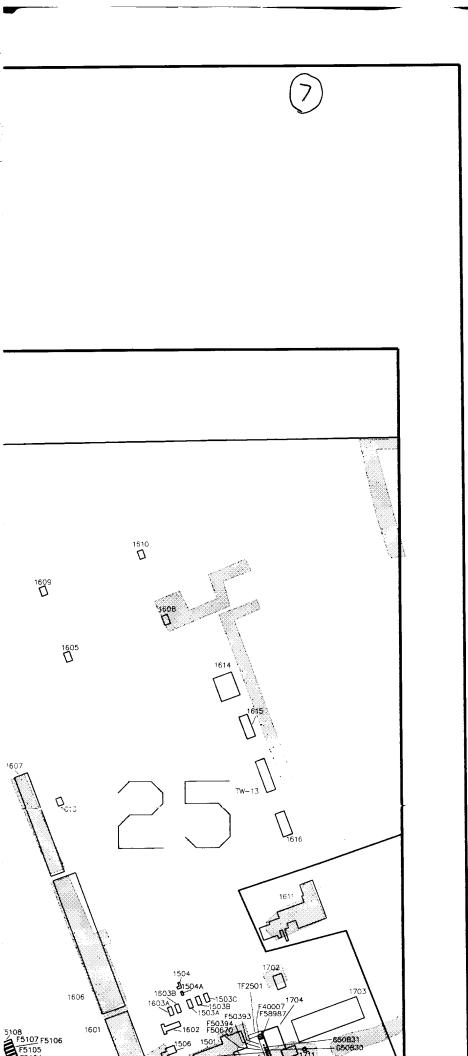
Rocky Mountain Arsenal Prepared by: Ebasco Services Incorporated

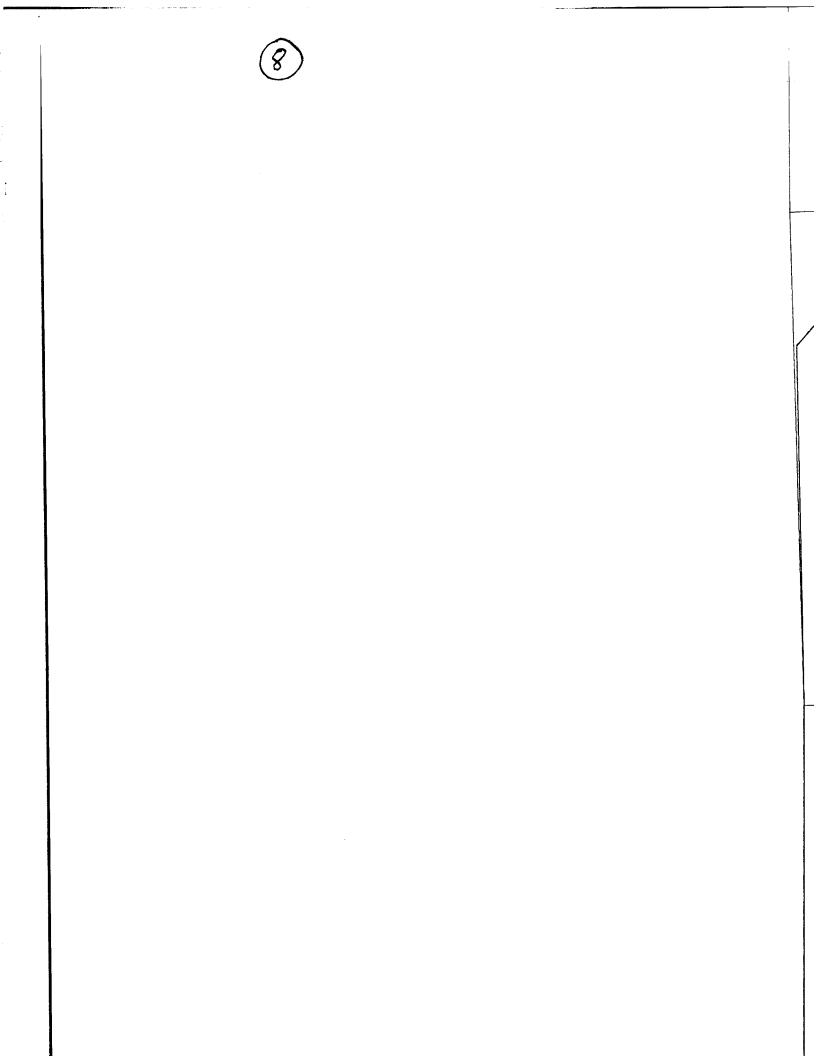




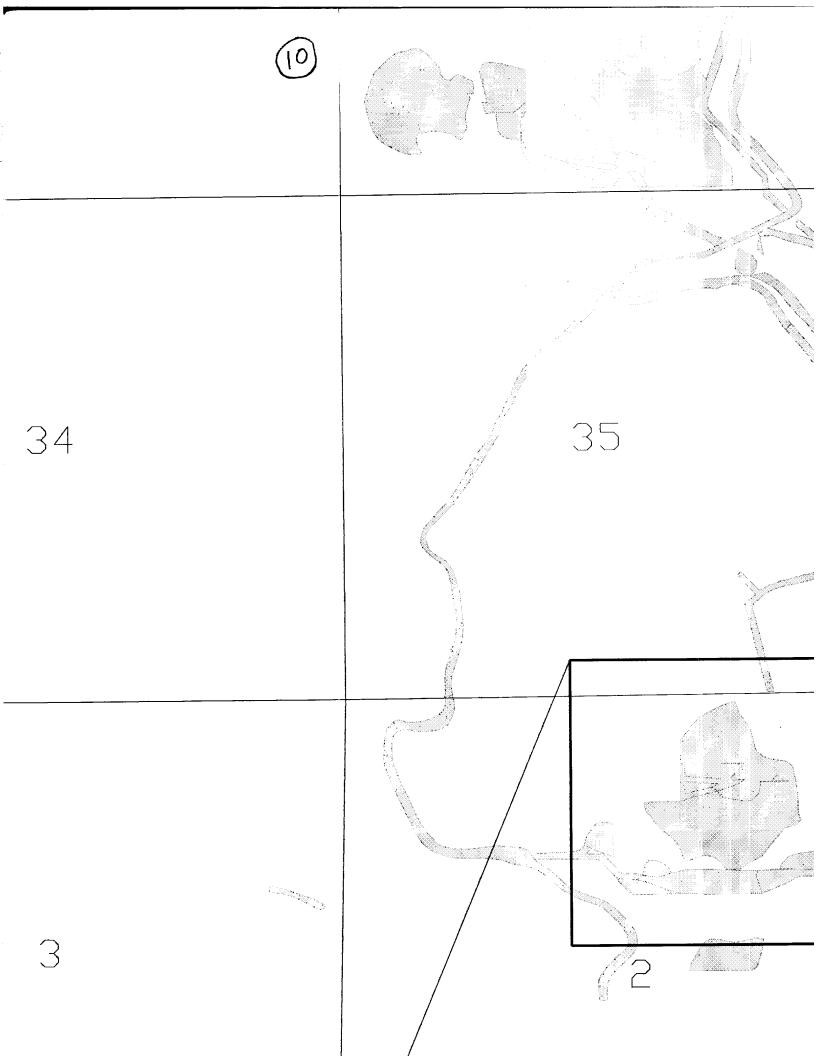


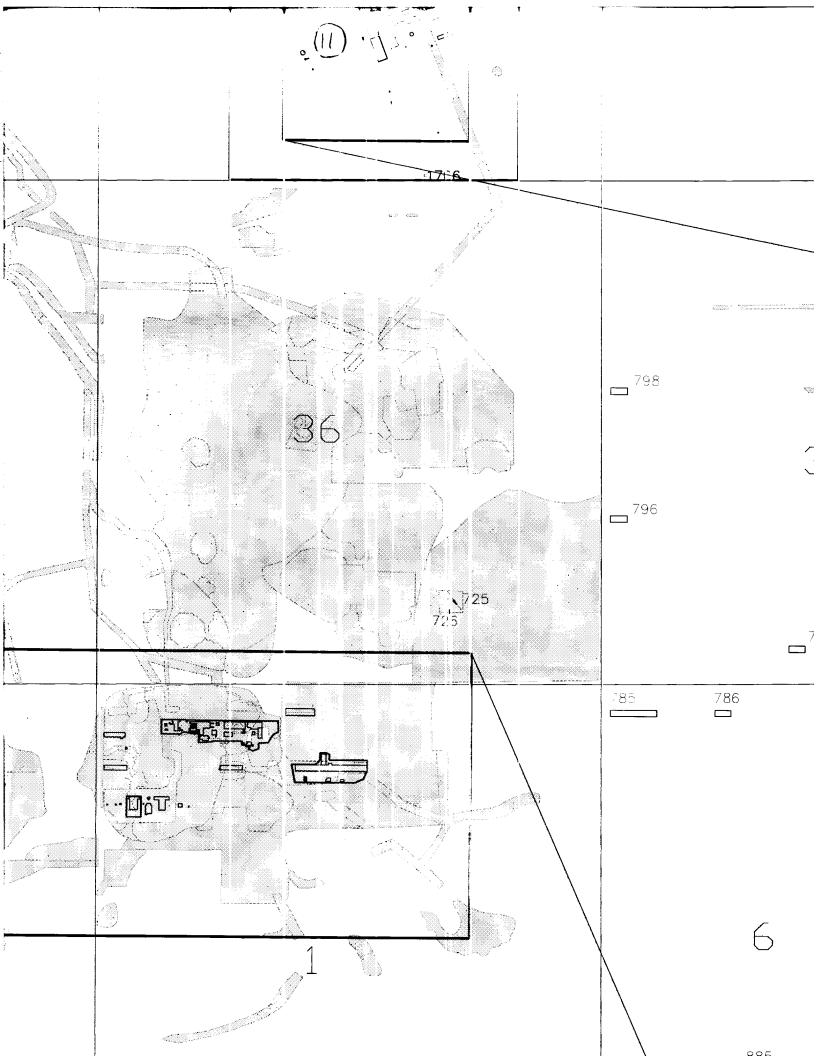


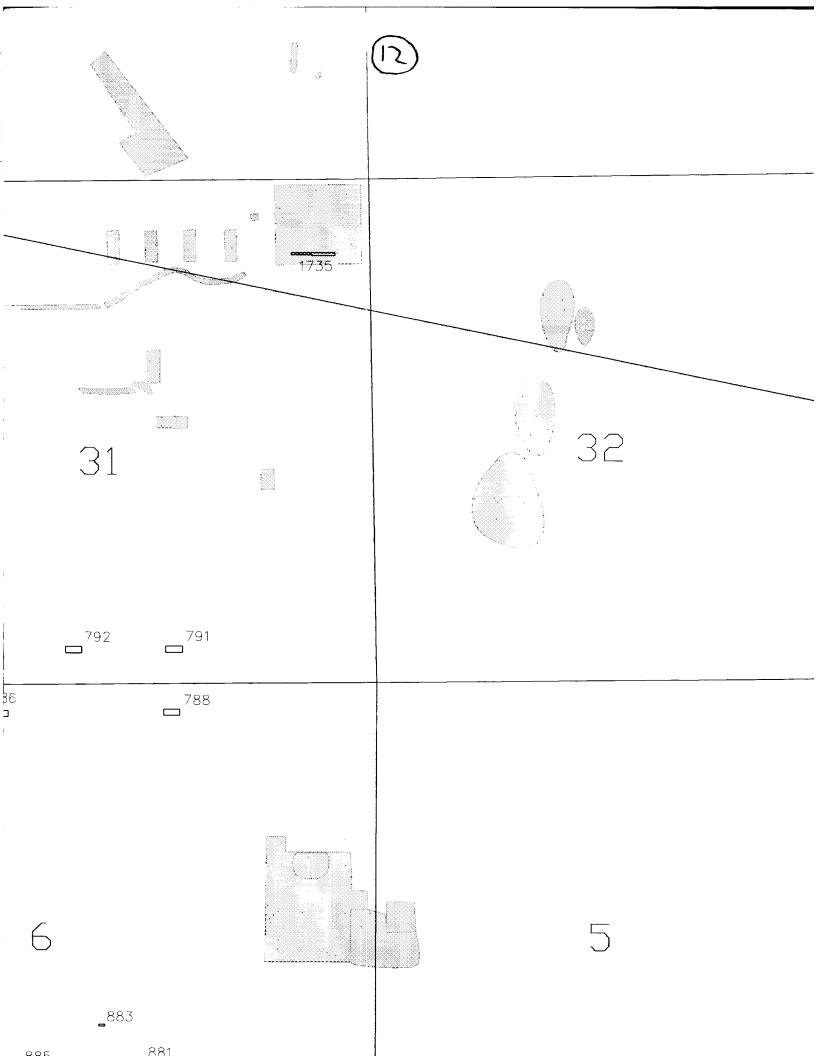


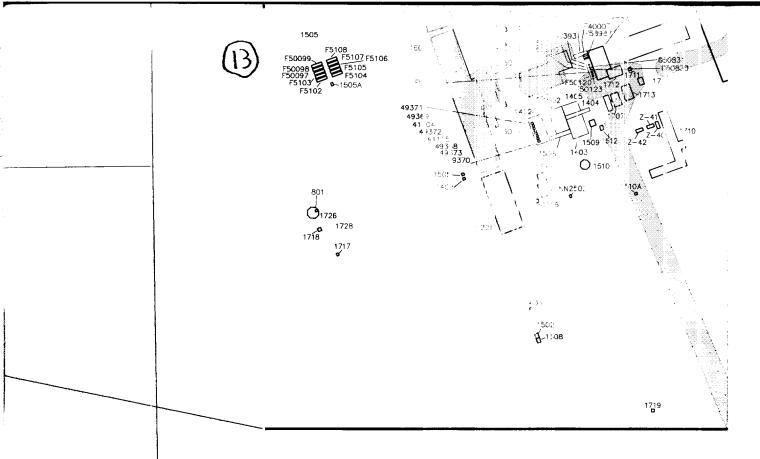




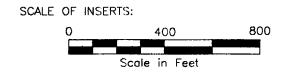






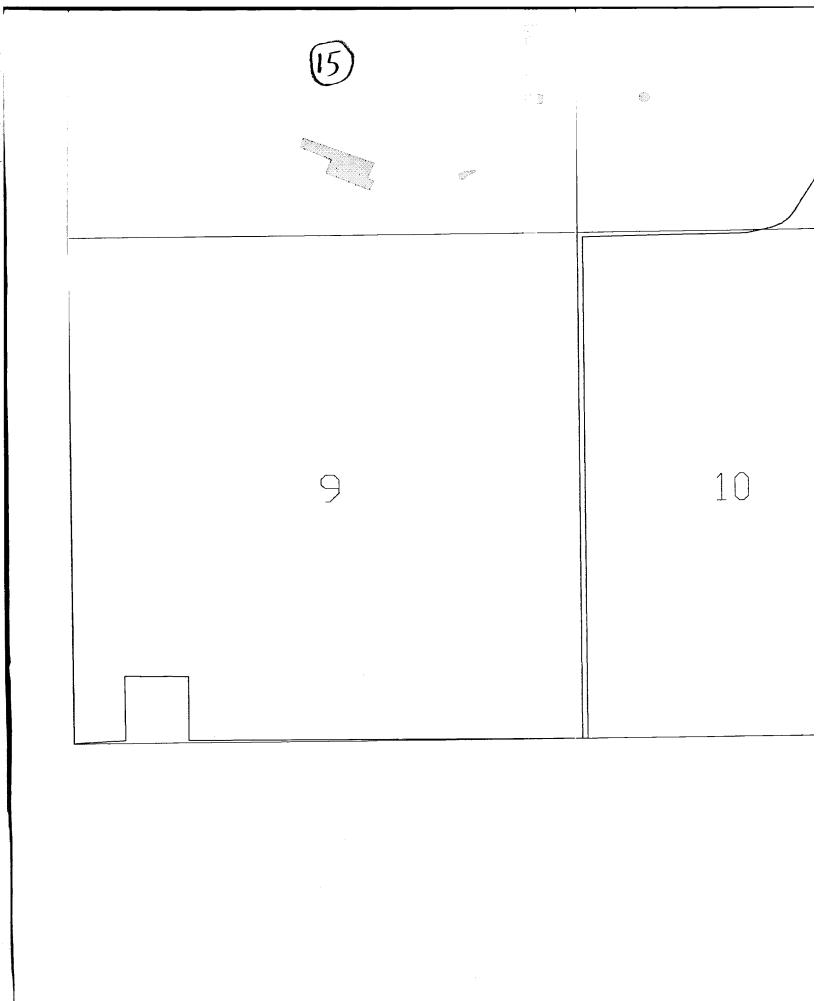


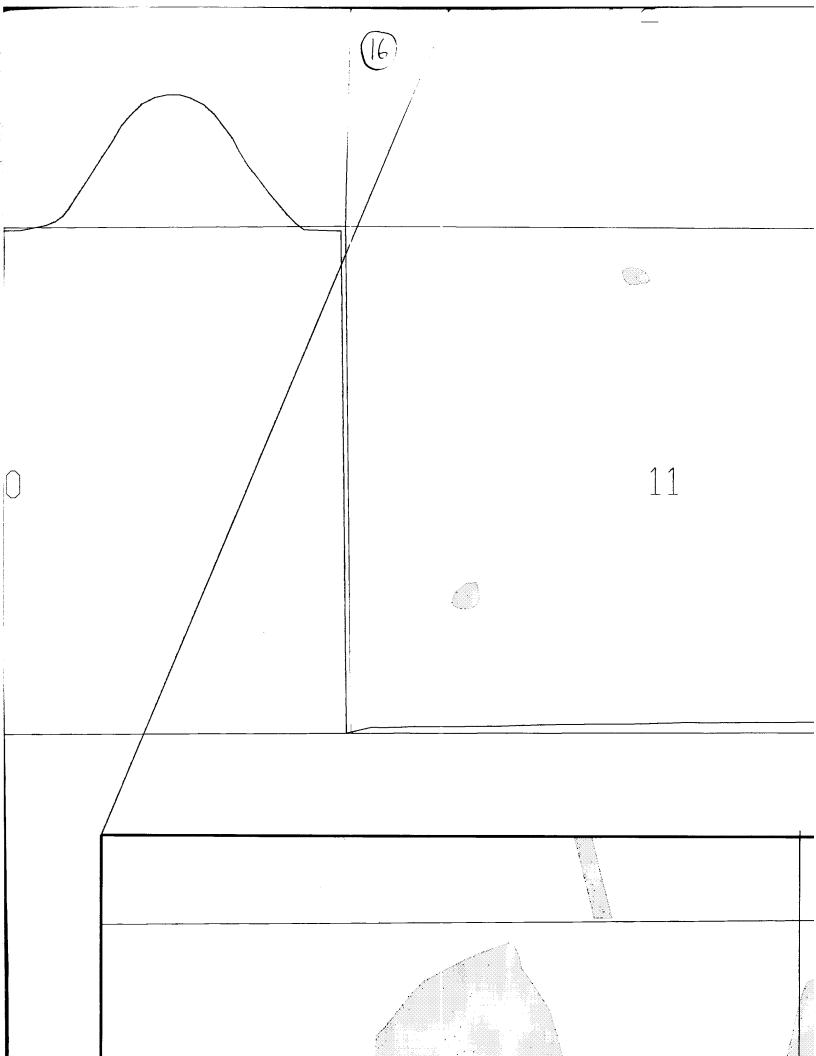
## NORTH PLANTS

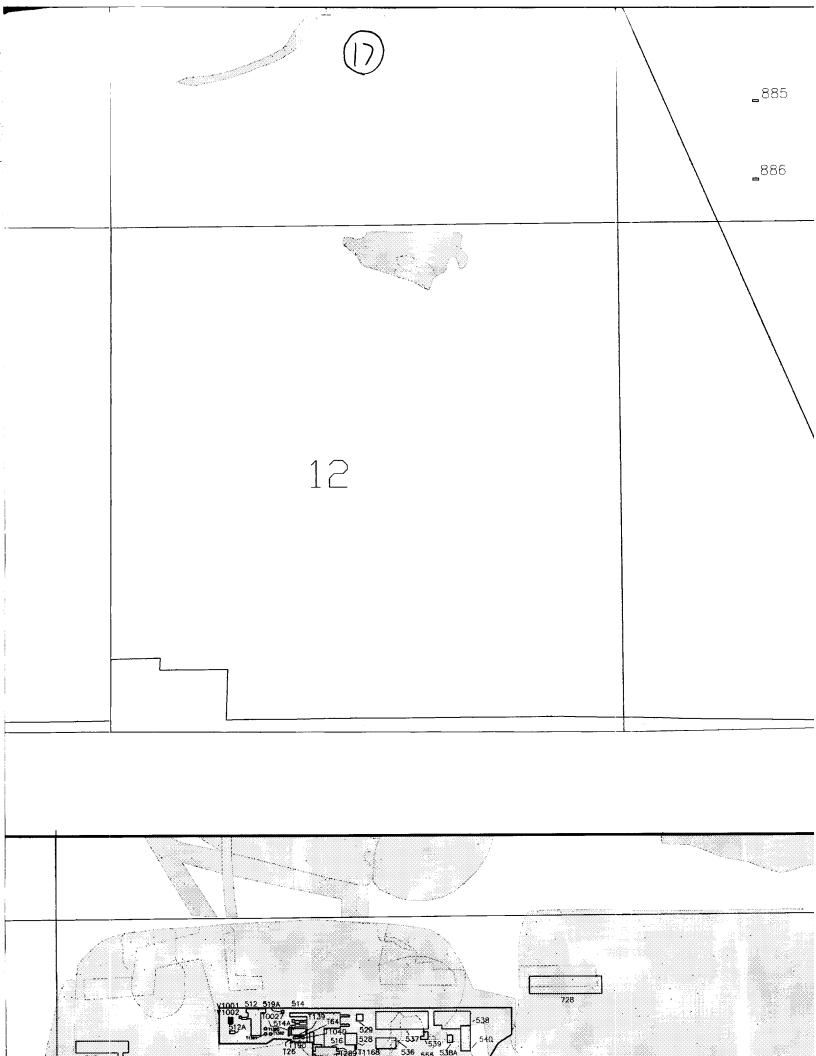


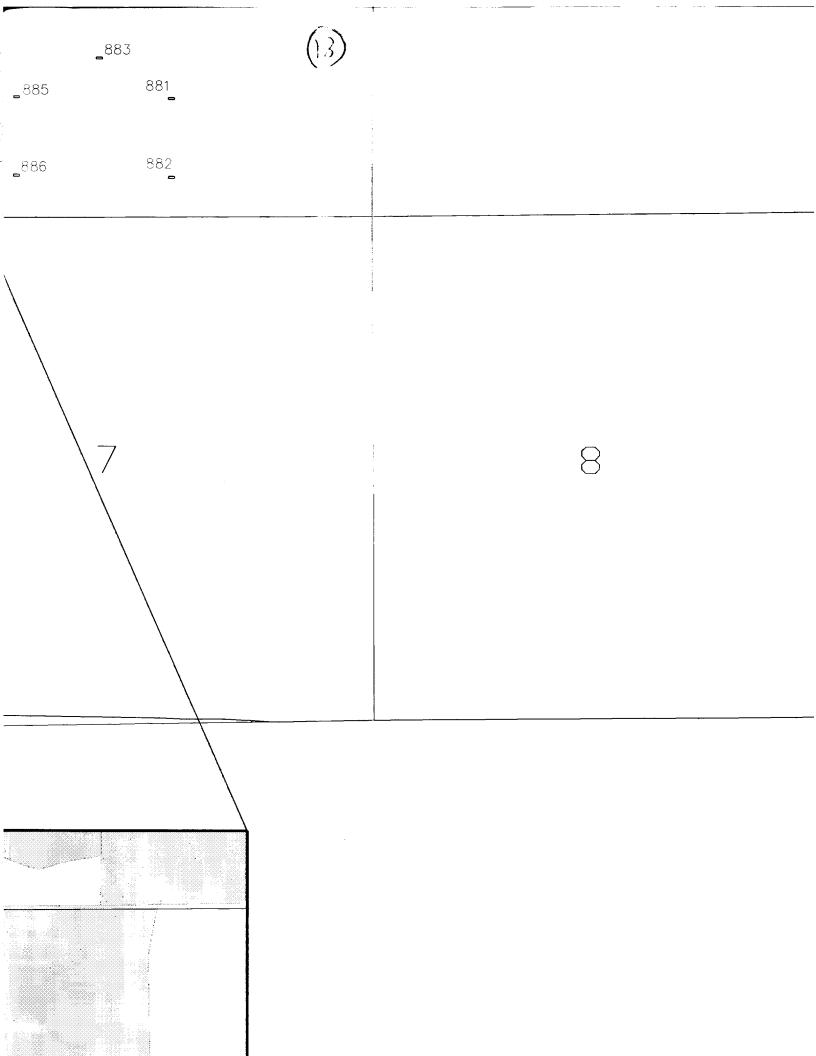
## EXPLANATION

- ———— Declared Perimeter for Chemical Agent Treaties
  - Buildings with No Future Use,
     Manufacturing History
     Process History Subgroup









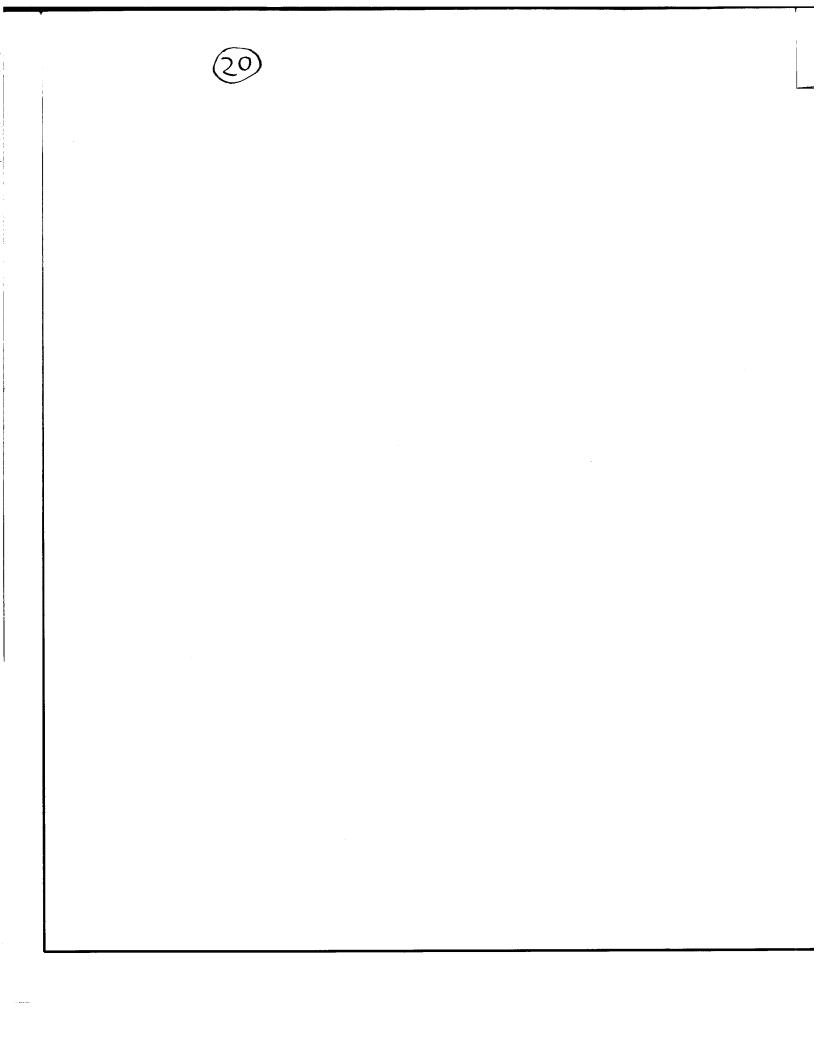


- Buildings with No Future Use,
   Manufacturing History
   Nonprocess History Subgroup
- Buildings with No Future Use,
   Agent History

Pipe runs are not shown on map Substations are not shown on map Not all tanks are shown on map

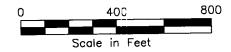


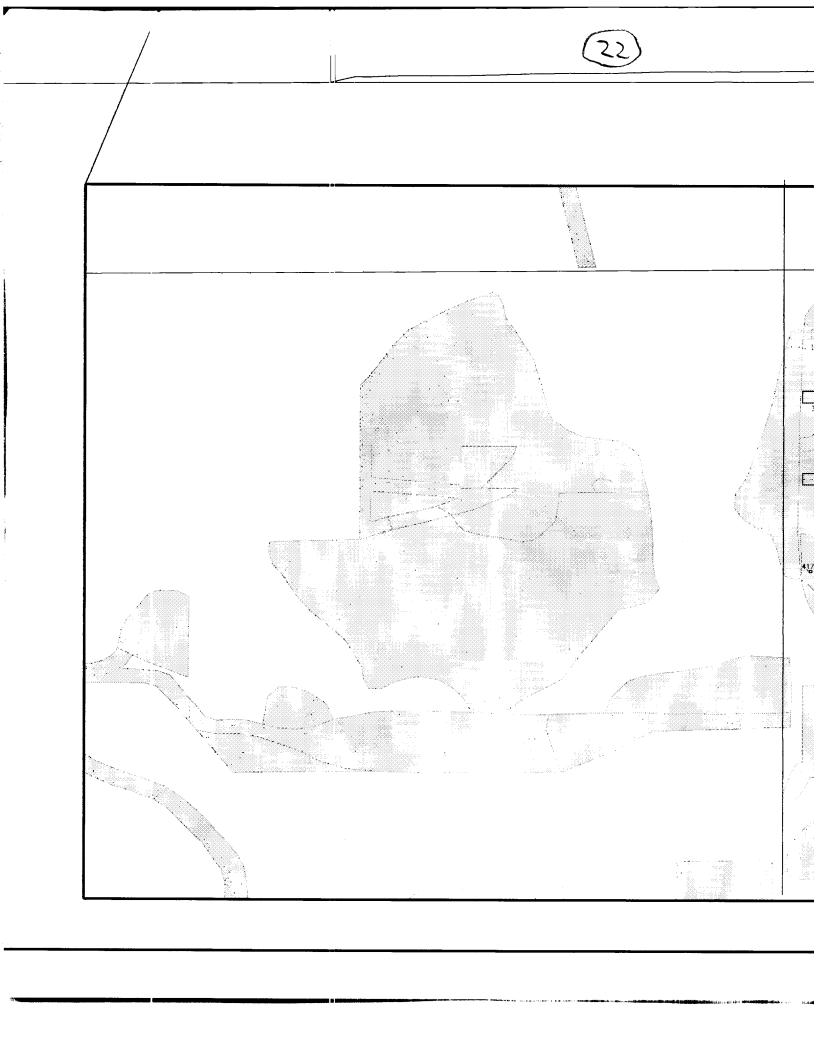
Shaded areas indicate sites where contaminated soil may require structure removal. Does not represent all areas of soil contamination.

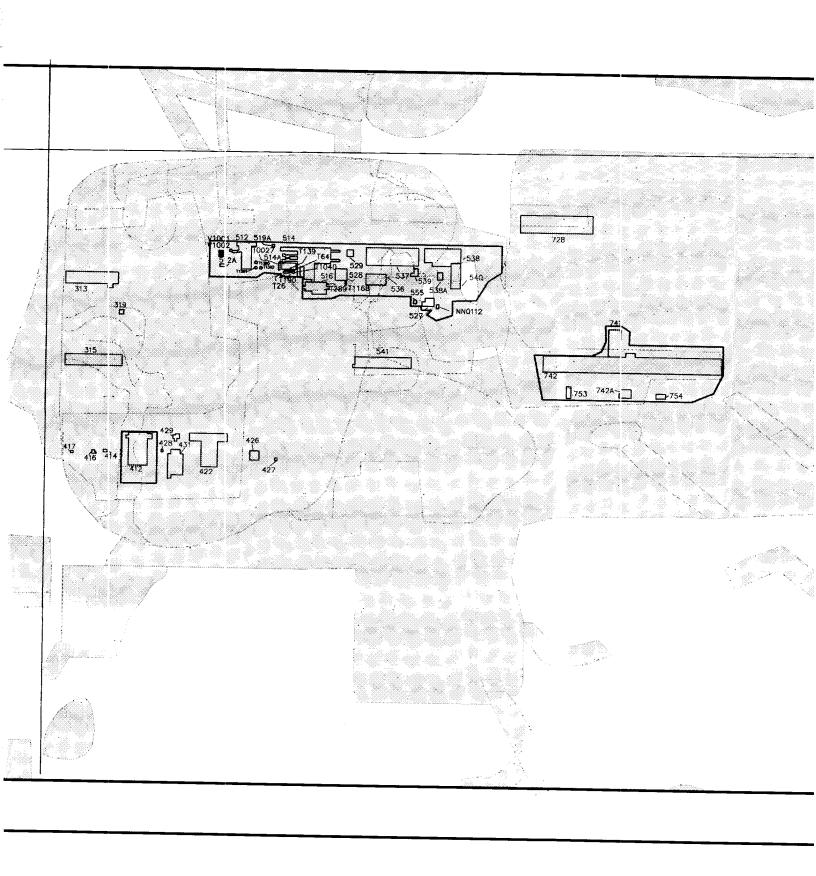


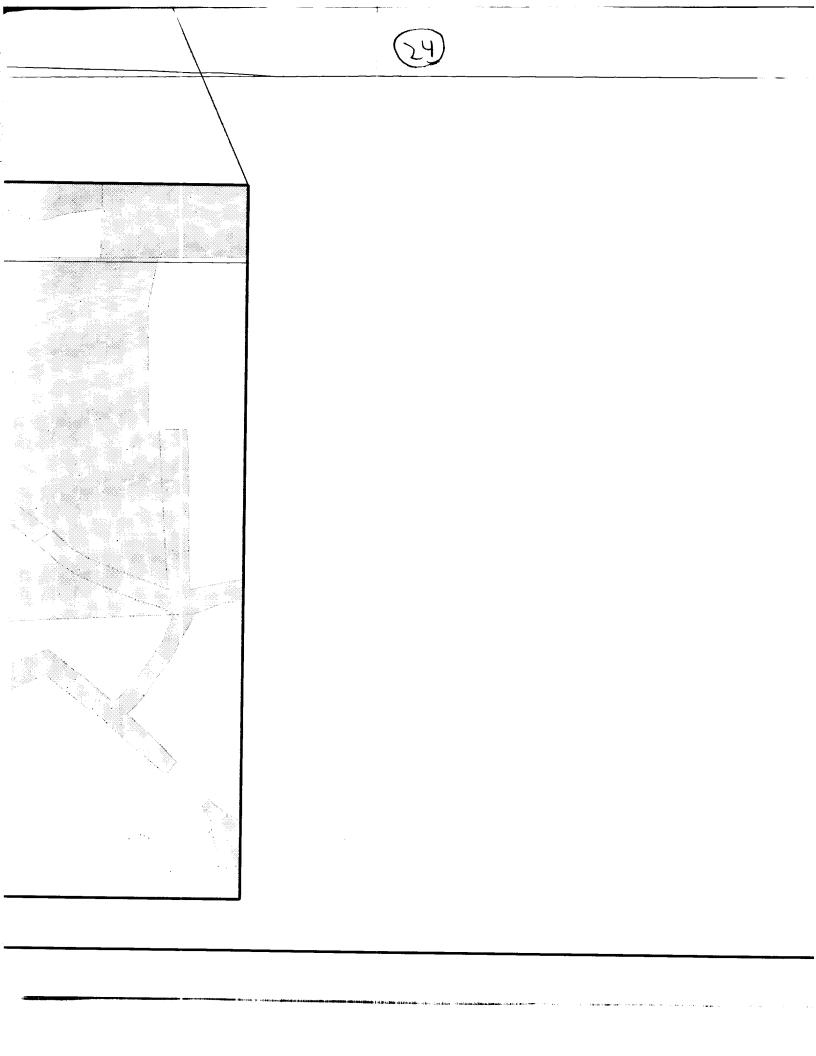
## SOUTH PLANTS

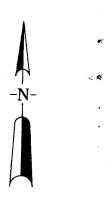
SCALE OF INSERTS:



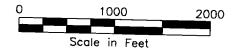








SCALE OF BASE MAP:



Prepared for:

U.S. Army Program Manager for Rocky Mountain Arsenal

Prepared July 1993

PLATE 3.0-1 Agent History and Treaty Structures

Rocky Mountain Arsenal Prepared by: Ebasco Services Incorporated